Neher, Christopher
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analysis of the
values of surface
uses of state
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FINAL REPORT

ECONOMIC ANALYSIS
OF THE VALUES OF SURFACE USES
OF STATE LANDS

TASK 1
FAIR MARKET VALUE FOR RECREATIONAL USES

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Report for Montana Department of State Lands
February 1993

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EXECUTIVE SUMMARY

Granting the right to access state school trust lands for recreational purposes is a use for which the school trust must be compensated - just like any other use. In the past this use was largely ignored - perhaps in part because there was not sufficient value (or economic demand) to make it worthwhile to set up a policy. In the present day, recreational experiences (particularly hunting and fishing) are highly valued and many individuals have both the time and money to take advantages of the opportunities Montana offers to participate in outdoor recreation. The state lands are more or less a random cross-section of Montana and, as such, offer a variety of valuable recreational opportunities. As we note below, the quality of hunting on these lands (measured by hunter success) is similar to the average for all hunting across the state.

Given that access to state lands for recreational use may be of value, there are at least four possible ways that revenues could be collected for this use. One approach is to sell recreational use licenses (for access to any and all accessible state school trust lands) to the general public. Another approach is to lease recreational rights to a middleman - guides and outfitters - who then charge their clients. The Montana Department of State Lands is pursuing both of these policies. They are reconciled by requiring outfitter clients to hold the public recreational use license and by making the outfitter leases nonexclusive (with regard to the rest of the public). Outfitter licenses were discussed previously. The focus in this section is on recreation use permits. However, there are several other approaches that the state could consider to this potential revenue source. One is to sell the rights of recreational access in conjunction with another existing surface use such as grazing or croplands. The agricultural leaseholder could then be the middleman and charge outfitters or the public for access to the section(s) they lease. The agricultural leaseholder could also simply hold the access right and not sell it if the revenue from recreation on the lease did not justify the costs of management. A rough estimate of the revenues from this approach was derived in our survey of ranchers and farmers holding state grazing and cropland leases. These results are as follows.

The question of whether to combine recreational access and other surface use rights in a single lease is in part an empirical issue. One would want to know if the school trust could earn a greater return by this policy or the existing policy toward recreational use. Some ranchers indicate they are willing to pay a higher AUM lease rate to have the right to control access. Our analysis indicates that about 25% of ranchers would be willing to pay an extra $2/AUM to control access; this is an average over the sample of about $0.50 per AUM or a total of about $500,000 over all grazing lease contracts. This is considerably more than the approximately $150,000 revenue from the DSL Recreation Use permit sales for 1992 (as of October 31) plus the approximately $55,000 obtained with outfitter leases. However, these programs are quite new, are probably not priced at fair market value and may show increased sales in the future. Additionally, one would have to design a system for obtaining extra payment from ranchers who wanted to control access. It would appear that combining recreational access and other surface use rights in a single lease could be done most effectively when leases are on a lump sum or dollar per acre basis and when there is good participation in competitive bidding. Neither of these conditions presently hold in Montana. It

is an open empirical question as to whether combining recreational access rights with surface uses in Montana would generate a better return to the school trust than current policy.

Respondents holding state cropland leases were asked if they would be willing to pay an additional amount (from $1.00 to $5.00/acre) for the right to control public access to the lease. Leaseholders were generally unwilling to pay for the right to restrict access. Overall, only 12% were willing to bid from $1.00 to $5.00/acre higher to control access. Willingness to pay for the right to restrict access to these croplands seemed to be unrelated to the bid amount.

A fourth way to derive revenues from recreational access is to have a public or private entity representing recreationists lease the rights for all or a part of state school lands. In Colorado, the state fish and game agency is planning to pay the state lands agency an annual fee for recreationists to have access to some portion of state lands. The advantage of this approach is that the costs associated with transacting with every recreationist (in the recreational access permit approach) is avoided. Of the current $5 collected on Montana's state lands access licenses, only $3 goes to the trust and the remainder covers the cost of license administration.

Our general recommendation is that the license system needs to be given time to work and to identify the extent of the revenues that can be captured from this approach. At some future point, the state may want to compare revenues from the public license plus outfitter license approach to the revenues that could be received by either: 1) selling access rights in conjunction with agricultural surface uses to individual leaseholders, or 2) negotiating with a public or private entity for all or part of the access rights. For example, perhaps the second approach might be best for forest lands where there is no agricultural leaseholder. The experience gained with the license system could be useful in providing a basis for negotiations should this second approach prove of interest.

In the remainder of this summary, we focus entirely on the recreational access license approach.

Effective March 1, 1992 accessible state school trust lands in Montana were open to residents and nonresidents for licensed hunting and fishing. As of November 30, 1992, a total of 28,450 state lands recreational use licenses had been sold. These cost $5.

The Montana Enabling Act of 1889 and the Montana Constitution of 1972 require that the state lands be administered so as to obtain full market value for their use. The purpose of this study is to estimate the full market value for these recreational use licenses and to report on the recreational activity undertaken on these permits.

The basic problem is identifying the economic demand relationship for the state lands licenses. This relationship is between the price charged for a permit and the quantity sold. At present only one point on this relationship is known (at $5, 28,450 have been sold). The question is how the quantity sold will change as prices are increased or decreased (curve A

or curve B in Figure S-1). The effect of a price increase on revenues depends on the shape of the demand curve as illustrated in Figure S-2. If the demand curve is relatively steep (quantity sold is unresponsive or "inelastic" to price changes) then revenue increases with price increases. If the demand curve is relatively flat ("elastic" or highly responsive to price) then revenues decline with price increases.

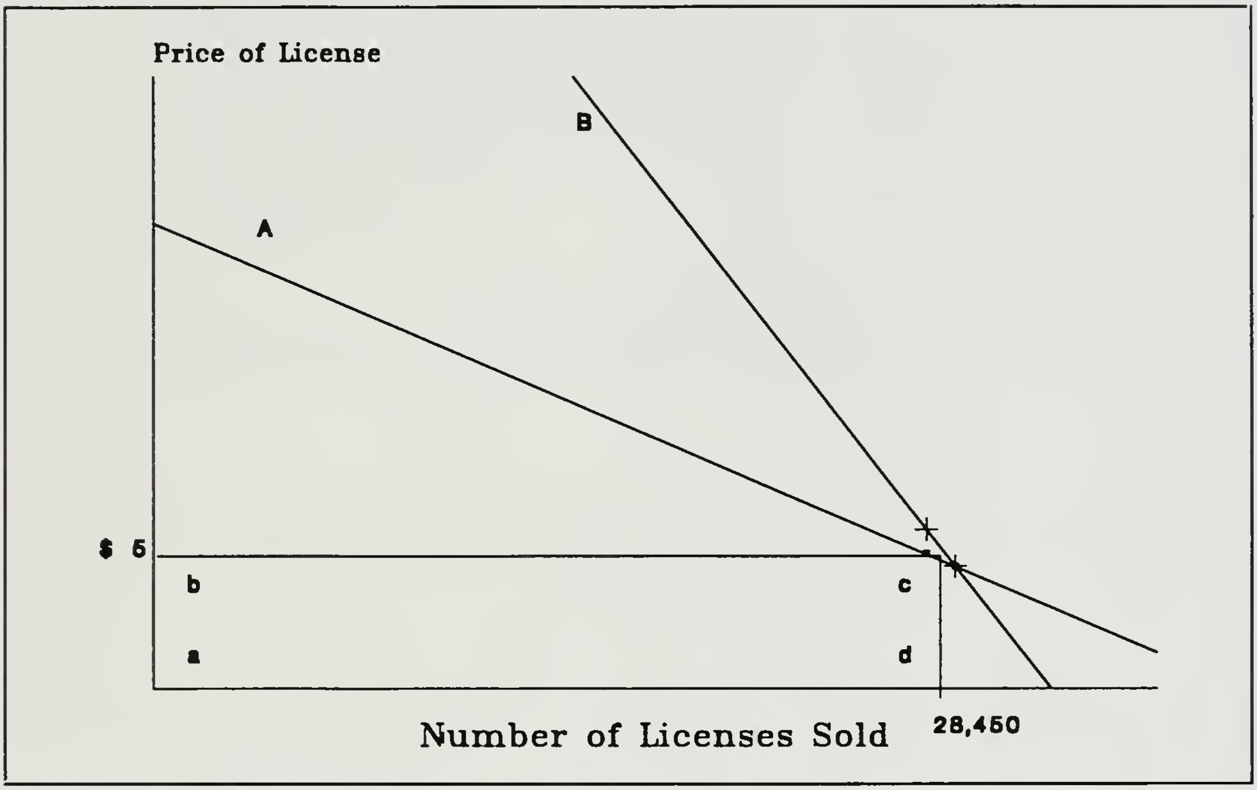

Figure S-1. Alternative Demand Curves Consistent with Observed 1992 Sale Price of $5.

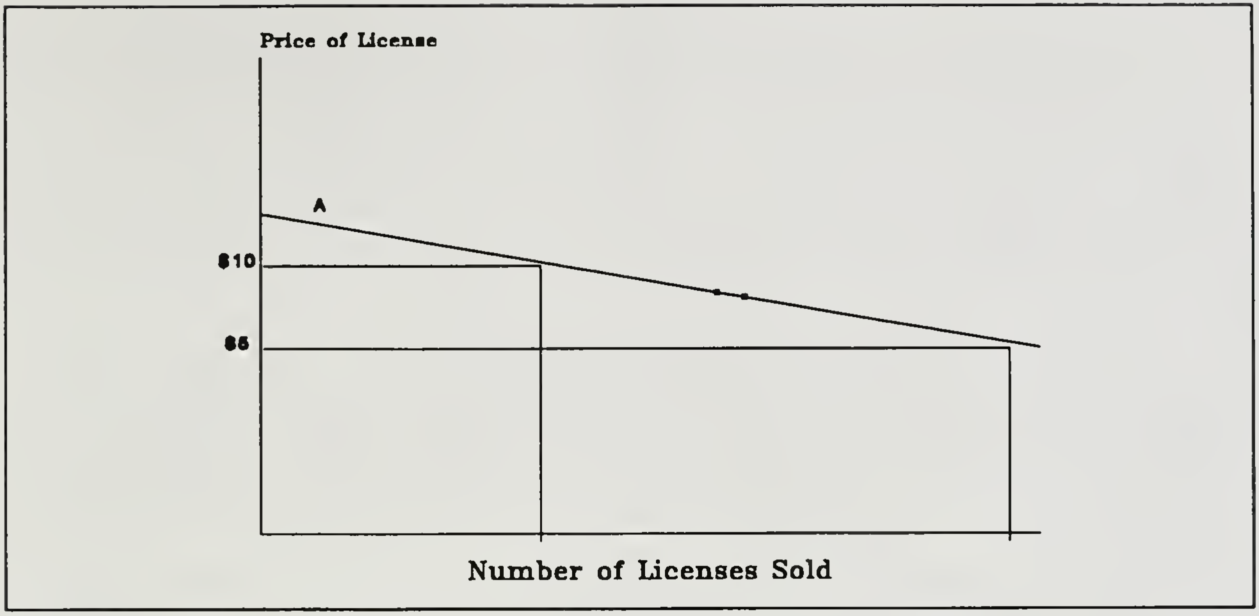

Figure S-2a. Effect on Revenue of a Price Increase: Elastic Curve Case.

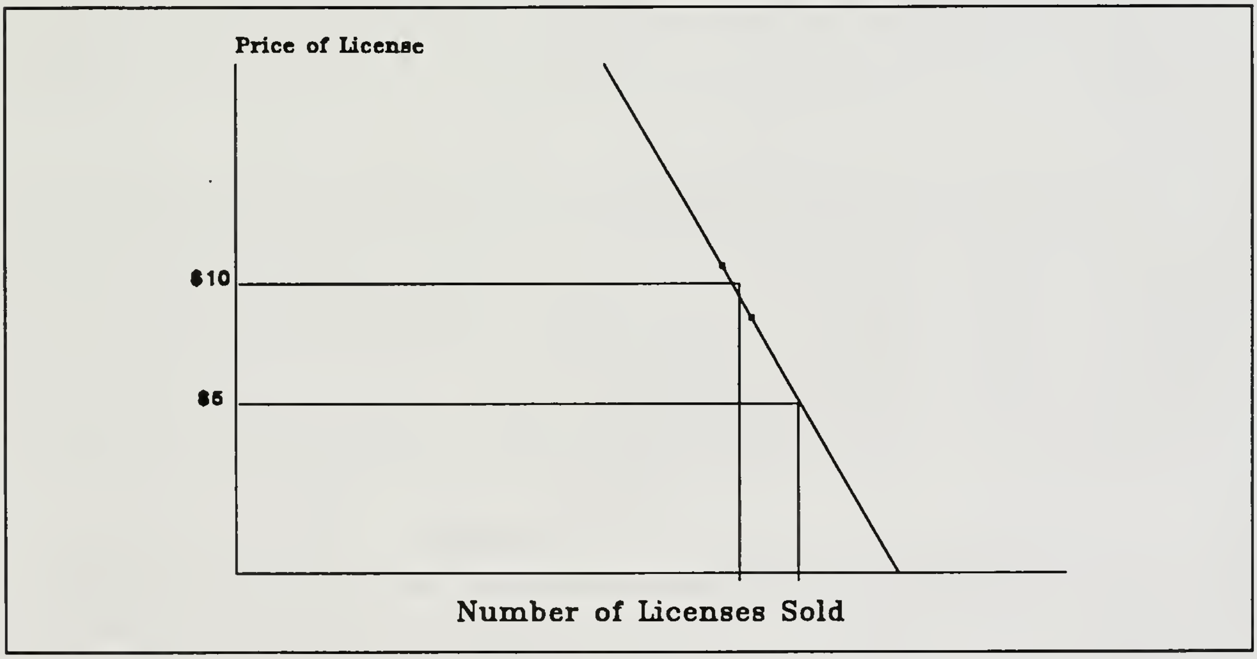

Figure S-2b. Effects on Revenue of a Price Increase: Inelastic Curve Case.

The state is essentially in a monopoly position in having control over state school trust access for hunting and fishing purposes. The state's market power (ability to control revenues through price) is moderated by the availability of free substitutes (such as national forest lands and open access private lands). By identifying the economic demand for the state land licenses, a revenue-maximizing pricing strategy can be determined. The analysis here is from the narrow standpoint of the constitutional requirement to maximize the return to the school trust. Policy makers may be interested in other objectives as well - such as the number of individuals that have access to school lands or the impacts on other surface leaseholders.

A number of methods were used to examine the economic demand for the state lands recreation licenses. These included the two types of models commonly applied in recreation analysis: contingent valuation models (CVM) and travel cost demand models (TCM). These two types of models are recommended by the U.S. Water Resources Council for economic studies of recreation demand and have been very widely applied.

Contingent valuation is also called the direct survey method; respondents in a phone or mail survey are asked what they would be willing to pay for a given commodity or for the opportunity to participate in a given activity. For the case at hand, respondents were asked: "Considering the use you will usually make of your State Lands Recreational Use License, would you choose to buy this license even if it cost __(dollar amount)__ ? 1. YES 2. NO". The dollar amount was systematically varied across respondents from $10 to $100 for residents and to $200 for nonresidents. This method can be used to directly construct the demand relationship for state lands permits and to estimate the average value of holding a permit.

The travel cost model is based on the observed relationship of the number of trips a given recreationist takes to a given site as a function of the cost of travel to the site. On the assumption that individuals would respond to site or permit fee in the same way they respond to increased travel costs, the economic demand for the site and the value of site access can be determined. For the case at hand, if individuals used their recreation license to visit only one site, then the value of the license is approximated by the cumulative value of all trips taken to the site over the recreation season. For the state lands license about 85% of license holders visited no more than one site. This approach is conservative in that it does not include the value of other sites that may have been visited.

The advantage of the travel cost model is that it is based on observed behavior. By contrast,the CVM model is based on stated behavioral intent. The economics literature shows that CVM responses provide a generally valid measure of the value of direct recreational use. For the application at hand we expect that the CVM may be conservative for a number of reasons as developed in the main report. One reason is that we choose to include so-called "protest responses" in our analysis. Follow-up questions sometimes indicate that the respondent said "no" to the CVM question because they are "protesting" the idea of paying for recreation or protesting potentially higher license fees when in fact they might actually be willing to pay the higher amount. There may also be strategic behavior on the part of respondents who would like their responses to favorably affect the price they will actually pay in the future.

In addition to the formal economic models of recreation permit demand, we used four other methods to provide further insight into either the average value of a permit or the shape of the economic demand curve for these permits. These include: 1) examining the actual response of deer hunting license sales to license fee changes in the western United States from 1970-1992, 2) examined the parallel market for fishing, bird hunting and general recreation permits on the Flathead Indian Reservation in western Montana, 3) examined fee fishing and fee hunting day use prices in Montana, 4) utilize a review of the economics literature on the value per day of hunting and fishing based on 287 studies of the value of outdoor recreation in the United States.

Data collection for this study included extensive telephone surveys of two populations: 1) current holders of Department of State Lands recreation licenses and 2) holders of the Montana Department of Fish, Wildlife and Parks (DFWP) conservation licenses. Conservation licenses are prerequisites in Montana for purchasing most hunting and fishing licenses. The population of conservation license holders is quite large: 271,924 resident Montanans and 164,819 nonresidents. Of this total of 439,743 conservation license holders, only 6.5% purchased the state lands licenses in 1992 (based on most current information). Conservation license holders were surveyed to determine why individuals do or do not buy these licenses. Recreation license holders were surveyed to obtain data on actual recreational use and to obtain data for estimating the economic demand models.

Pilot surveys of several hundred individuals from both populations were conducted in July 1992. The major finding was that the primary recreational activity on state lands was likely to be hunting. Given this, drawing the state lands recreation license sample was delayed until December 10, 1992, at which point DFWP (which administers license sales for state lands) had in hand the license receipts for sales as of November 30, 1992. Both surveys were conducted in December-January 1992 in order to be after hunting season but soon enough to avoid recall bias. The recreation license sample was 3,867 license holders. A response rate of 76.4% was achieved with 2,384 completed surveys. A total of 1,067 conservation license holders were surveyed with a total of 598 completed surveys (67% completion rate). These are very respectable response rates for phone surveys.

The main finding from the conservation license sample was that almost half (45%) of the general population of Montana resident and nonresident hunters and anglers did not know the state lands license existed. Reasons given for not purchasing a license in 1992 included "doesn't know about issue" (34%), "won't use state lands" (40%), "fee is a rip-off" (7%), and "does not hunt" (4%). Because of the lack of knowledge about the license, there is considerable uncertainty involved in any attempt to forecast changes in future license sales. The responses suggest that if the public was informed about the availability of licenses, sales could increase from 60% to 160%. Respondents were also queried as to whether they would be more likely to purchase the license if additional activities (hiking, wildlife observation, etc.) were also permitted. Again a very broad and uncertain range of between a 10% and 60% increase is indicated. The basic finding is that license sales would likely benefit from a marketing or public information effort on the part of state lands. Given the lack of knowledge about the licenses (and about the locations, accessibility and qualities of the state school sections), there appears to be substantial potential for increasing sales.

Table S-1. Economic Demand and Valuation of State Lands Recreational Use License.

Method	Commodity	Average WTP	Elasticity of Demand	Price
Contingent Valuation Model				
Residents	Season License	19.46	-0.97	25.00[1]
Nonresidents	Season License	68.92	-0.63	50.00[1]
Travel Cost Model				
Residents	All Trips to One Site	62.92	--	--
Parallel Market Examples				
Model of Deer Hunting Tags	Multi-State Demand for Deer Hunting Licenses	--	-1.03	--
Flathead Reservation Permit	Season License: Fish, Hunt, and Camp	--	--	30.00
Private Landowner Access Charges				
Fishing	Day	--	--	20.00 - 40.00
Hunting	Trip	--	--	10.00 - 100.00 Mean 49.00[2]
Literature Willingness to Pay Estimates				
Cold Water Fishing	Day	10.07 - 118.12 Mean 30.62[3]	--	--
Hunting	Day	16.58 - 142.40 41.69[3]	--	--

[1] Values are the estimated profit maximizing levels for the state lands license fees.

[2] From 1992 survey of Montana outfitters

[3] From Walsh, Johnson, and Mckean (1988)

From both surveys, the main reason for purchasing the license was hunting (70%). Most respondents were targeting deer and elk, but bird hunting and antelope hunting was also important. The usual differences between resident and nonresident hunters and anglers were reported. Residents took an average of 2.1 trips lasting 2.5 days. They traveled only 88 miles one way and spent an average of $88 and rarely (2%) used a guide. Nonresidents spent $1445 on average, traveled 1232 miles one way, 32% used a guide, and they took one trip (on average) lasting nine days. These estimates are similar to estimates for the average Montana hunter obtained in previous surveys by Montana DFWP. Hunter success was on the order of 50% for residents and 75% for nonresidents (these success rates include bagging species such as game birds or antelope and so are quite high).

The basic findings of each of the six methods for examining the economic demand and value associated with the state lands licenses are summarized in Table S-1 and are described as follows. The contingent valuation models were estimated and provided a good fit to the data (Figure S-3). Statistically significant relationships were identified that explain the probability of purchasing a license as a function of the stated price, and respondents income, residence, gender, availability of substitute recreational areas, and whether the respondent was a hunter. The relationships had the theoretically expected sign. This indicates that the responses are not random but reflect rational economic choices.

Table S.2. Percentage of Respondents Answering "Yes" to Alternative Bid Levels, by Residency.

Bid Level	Residents	Nonresidents
10	0.462	0.714
15	0.291	0.660
20	0.246	0.686
25	0.239	0.512
30	0.197	0.592
50	0.131	0.474
100	0.063	0.273
200	--	0.059
Sample Size	1866	324

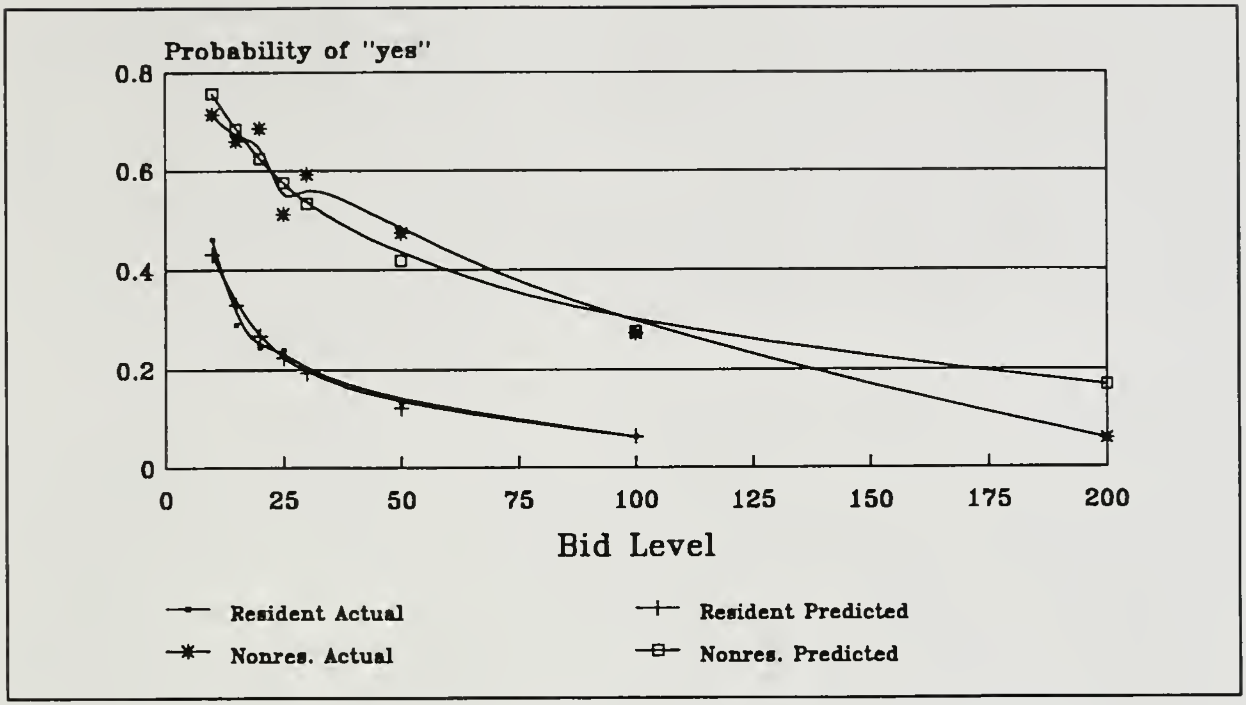

Figure S-3. Comparison of Actual and Predicted proportion of "Yes" Responses, by Residency.

At higher stated prices, resident license sales drop off rapidly to about 45% of current sales at $10 and to 13% at $50 (Table S-2). Resident license sales are not as responsive to price with 45% still willing to purchase a license at $50 price and 27% at $100. Revenues increase somewhat with increased price for residents up to $25 and then are fairly stable at prices between $25 and $100. Revenues for nonresidents increase sharply and continuously up to a price of $50; revenues at $50 and $100 are similar and then decline sharply at a price of $200. The relationship of price to revenues depends on the shape of the demand curve. As noted above (Figures S-1 and S-2) a flat or "elastic" curve results in a decrease in revenues for a price increase and conversely for an "inelastic" curve. The shape or slope of the demand curve is best described by a parameter called the "elasticity of demand". The latter is simply the percentage change in quantity demanded for a one percent change in price. Curves that are fairly flat or "elastic" will have an elasticity greater in absolute value than one and "inelastic" curves have an elasticity less in absolute value than one. When demand is at "unitary" elasticity (e.g. equals -1.0) price changes have no effect on revenue. As noted in Table S-1 and as one would suspect from the relationship of price and revenue for residents (Table S-2), the elasticity of demand for residents is a just a little less than one. By contrast,it is significantly less than one for nonresidents through most of the range of the demand relationship.

Based on the findings in Table S-1, it appears that prices that would maximize return to the state school trust are on the order of at least $25 for residents and $50 for nonresidents. As noted in the main report, there is less uncertainty (tighter statistical confidence intervals) for

predicted revenue at these relatively lower prices. Accordingly, we would suggest that prices of $25 (residents) and $50 (nonresidents) are likely to result in significantly increased revenue and are appropriate full market prices for the case at hand. We note that revenues would be maximized in this case by charging nonresidents a higher rate than nonresidents. This is consistent with the economic theory of price discrimination in cases where separable markets have different elasticities of demand. There is precedent for this in the practice by Montana DFWP of charging considerably higher prices to nonresidents compared to residents for hunting ($462 versus $54 for the big game combination license) and fishing ($45 versus $15 for season permit). The relatively large divergence for hunting permits is related in part to a quota on nonresident permits.

We also report in Table S-1 an "average willingness to pay" for state licenses based on the CVM models. Average willingness to pay is the average of the maximum amounts respondents would be willing to pay rather than do without the resource. This is not the same as price but is instead a measure of the net benefits to recreationists of using a given resource. Maximum willingness to pay can vary considerably from individual to individual and generally can not be extracted from each respondent in a typical (single equilibrium price) market. It is instead an indicator of the net value associated with a given commodity. The relationship of average willingness to pay and market price will depend on the shape of the demand relationship and market structure. One can say that the two will move together: generally higher average willingness to pay indicates the potential for generally higher market prices. Average willingness to pay per license based on the CVM model is $20 for residents and $69 for nonresidents.

None of the remaining models is as specific as the CVM model in terms of providing results that are unique to the state lands license. The other models are also not as readily comprehensive - in terms of providing easily computed measures of average willingness to pay, elasticity of demand and plausible market prices. The limitation of CVM is that it is based on behavioral intent, not observed behavior. For the case at hand we expect it is conservative. Accordingly, we examine the problem using the remaining five methods.

The travel cost model was estimated for trips taken to the most recently visited site based on our phone survey. The model provides a good fit to the data and results in an estimated average willingness to pay of $55 for all trips to the given site. The model provides a good fit to the travel cost data and includes a number of statistically significant parameters with the theoretically expected sign. The average willingness to pay is more than double the estimate from the CVM model; presuming the travel cost estimates are sound, this suggests the CVM model is probably conservative.

Another approach to examining average willingness to pay is to look at other economic studies of outdoor recreation. A recent review of 287 such studies found that the average willingness to pay per day for fishing was about $30 (with a range of $10 - $118) and the value per day for hunting was about $40 (with a range of $16 - $142)(Table S-1). Studies specific to Montana have generally been in the upper end of the range. Suppose one assumes that the quality of hunting and fishing on state school trust lands is at least as good as the average quality for previously studied resources. Then the permit values implied by these

estimates (given an average for residents of two trips and two and one-half days per trip) is $150 to $200. This suggests that both the CVM and TCM estimates provide conservative measures of license value.

Another measure of elasticity of demand for licenses is provided by our sample of resident deer hunting license sales from 1970-1992 in the western United States. We chose deer hunting because this is the dominant activity undertaken on the state lands license in 1992. We don't have a real price history for the new state lands license; however, some insight into how hunters will respond to price increases can be obtained through this model. This sample of resident deer hunting licenses shows considerable variation over time in prices and quantity sold. The estimated model fits the data well and has a highly significant parameter on price. The elasticity of demand for resident deer hunting licenses is about -1.0 - quite similar to our estimate from the CVM model.

Another perspective on the problem is to examine the pricing policy of another entity with a monopoly on recreational access to a significant land area. The Confederated Salish and Kootenai Tribes have general recreation, fishing and bird hunting permits for access to 1.24 million acres in northwest Montana (Table S-3). Compared to the DSL permit, the tribes charge a total of $30 for all activities (but no big game hunting is allowed) on a smaller area (compared to 5.2 million acres of state lands - not all of which is accessible). The tribe sells a total of about 24,000 permits (all uses combined). The permits are not exactly comparable, but the use omitted from the tribal permit (big game hunting) is generally the most valuable use - yet the tribe charges substantially more than the state.

Another perspective on prices is provided by fee fishing and fee hunting prices in Montana. Fee fishing rates per day vary from $20 to $45 on Nelson Spring Creek, Red Rocks and on other streams in the Dillon area. Fee hunting based on a sample of nine observations obtained from our outfitter survey averages $49 per trip (outfitter payments to landlords per hunter) and ranges from $10 to $100. One $1000 transaction was also recorded but not included in the average. Given multiple days and multiple trips on state lands, these prices again suggest that the state license fee is low. Of course the existing fee hunting and fishing sites may be of somewhat higher quality than the average state section.

The conclusion we reach from this analysis is that one can be perfectly confident that the current price of $5 for the state lands recreation use license is below the "full market value". There is inevitably some uncertainty as to the optimal price - particularly given that the license has only been available for less than a year. However, the fact that license sales are likely to increase as more people become aware of its existence does not modify the need to price at market value. We would suggest that a conservative strategy would be to move resident prices to $25 and nonresident to $50. If one were squeamish, this could be done over several years. The results should be monitored and prices adjusted at modest intervals to obtain full market value - through an iterative process. This is a typical strategy in real markets.

Table S-3. Comparison of Prices, Activities, and Resources for DSL License and Flathead Reservation Recreational Use License.

Attribute	State Lands License	Flathead Reservation Use and Conservation Permits
Price by Activity		
Recreation	--	$6.00
Fishing	--	$12.00
Hunting	--	$12.00
Subtotal	$5.00	$30.00
Acreage Available	5,200,000	1,240,000
Big Game Hunting Available	Yes	No
Activities Besides Hunting and Fishing	None	Camping Hiking
Season	DFWP	DFWP
Permits Sold (1992)		
Recreation	--	14,186
Fishing	--	8215
Hunting	--	2089
Combined Fish and Hunt	28,450	--
DFWP licenses Required?	Yes	No

An important aspect of state policy toward the state recreational use license is the role of information and marketing. It appears that at present only half of the potential buyers are aware to the existence of the license. This suggests considerable gains to modest advertising. Additionally, it may be important to change "the image" of what the license entails. The license provides the right to hunt and fish on state school trust lands; unless there is nothing at all unique or special about these lands, the right of access is certainly worth more than $5. The problem may be that the license is named a "recreation use license"; this suggests entrance into a park or something to do with general recreation. The license instead transfers a right to participate in two of the most highly valued outdoor recreation activities - hunting and fishing - on a substantial and fairly random sample of the Montana landscape. Perhaps the permit should be renamed the "Montana school trust lands hunting and fishing access permit".

FINAL REPORT

ECONOMIC ANALYSIS OF THE VALUES OF SURFACE USES OF STATE LANDS

TASK 1
FAIR MARKET VALUE FOR RECREATIONAL USES

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Report for Montana Department of State Lands
February 1993

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1.0 INTRODUCTION

1.1 Introduction

This is a report for the Montana Department of State Lands on the subject of fair market values for recreational uses of state lands. Recreational uses are Task 1 in a larger project, "Economic Analysis of the Values of Surface Uses of State Lands", which is being conducted by Bioeconomics, Inc. of Missoula, Montana. This study began in May 1992 and will be completed in January 1993.

The basic approach to this problem is to collect information on patterns of use on state lands and attitudes regarding that use. This information was collected using two surveys. The information on visitation patterns to state lands and usage patterns of those lands was gathered through a survey of 1992 Montana Department of State Lands (DSL) recreational use license holders. The second source of information was gathered through a survey of holders of Montana Department of Fish, Wildlife and Parks 1992 conservation licenses. This group represents the population of recreationists who potentially might have purchased 1992 DSL recreational use licenses.

This report analyses the responses to the Montana State Lands Recreation License Sample as well as the DFWP conservation license sample.

2.0 METHODS

2.1 OVERVIEW

The problem of determining the fair market value for recreational use of Montana state lands is fundamentally different for recreational uses than for grazing and cropland uses. Unlike for grazing and cropland uses, there exists no competitive market for recreational uses. In determining a fair market price for state grazing leases a comparison can be made between those state lands and similar privately leased lands. The prices charged for the private leases can be used to estimate a comparable fair market price for the state leases. Unfortunately, in the case of recreational uses of state lands only a limited private market exists.

The market structure for recreational uses of state lands is different than for other uses in that the state holds the position of a monopoly in the sale of rights to use these lands. This monopoly position means that the state need know only one thing in order to maximize it's revenue from the sale of recreational use licenses; they must know the shape of the demand curve for the recreational use license. After the first year of the license program one point on that curve is known; as of November 30, 1992 there had been 28,450 licenses sold at a price of $5.00.

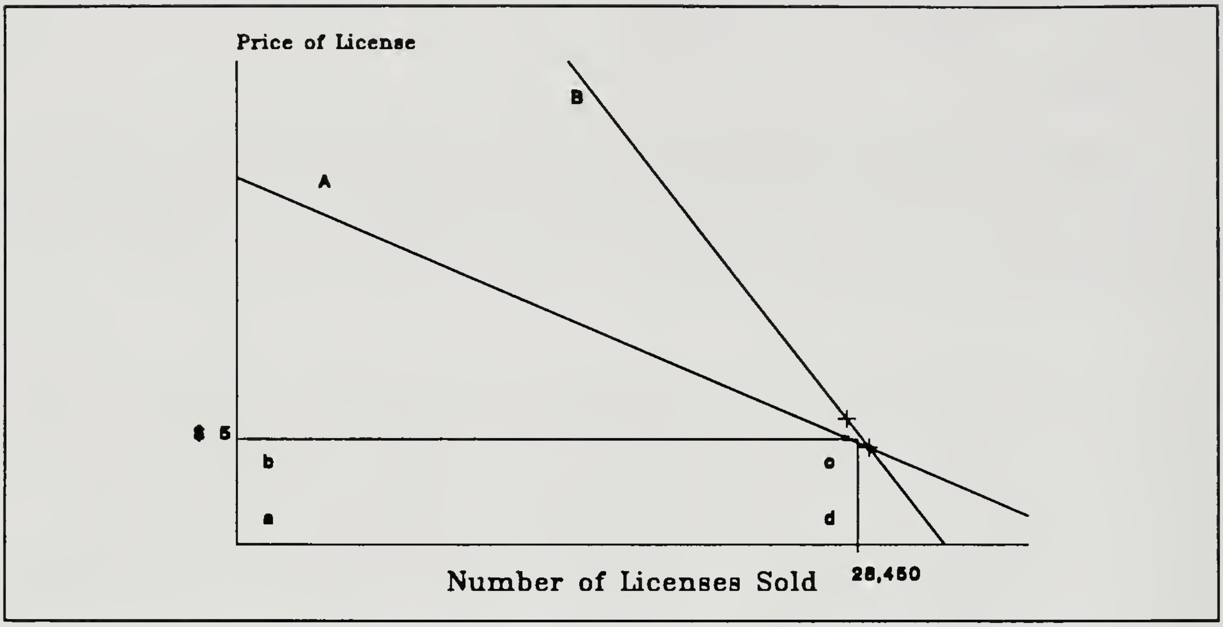


Figure 1.1. Alternative Demand Curves Consistent with Observed 1992 Sale Price of $5.

A demand curve illustrates the relationship of price and quantity sold. The question is what is the shape of the demand curve which passes through our one know point. Figure 1.1 shows two possible shapes for the demand curve. Curve B is relatively steep while curve A is quite flat. The shape of the demand curve is important because it determines how large an increase or decrease in the number licenses sold will result from a given decrease or increase in the price of the license. The modeling methods employed in this report all are designed to predict the shape of the demand curve for Montana state lands use licenses. Though their methodologies differ sharply, the purpose of each technique is to determine the relative responsiveness of recreational use license sales to changes in the license price. Note that one way to define the responsiveness of quantity demanded to price is "price elasticity of demand". This is simply the percentage change in quantity for a given percentage change in price. When this ratio is less than 1.00 in absolute value it is called "inelastic", like curve B, and when it is greater than 1.00 it is called "elastic", like curve A.

Figures 1.2a and 1.2b show the importance of understanding the shape, or relative elasticity, of a demand curve. As was shown in Figure 1.1, one point is known on the actual recreational use license demand curve (28,450 licenses sold at $5). If the state were to raise the price of the license to, for example, $10 the change in the number of licenses sold would vary dramatically depending on whether the actual demand curve was elastic 1.2a or inelastic 1.2b. If the actual demand curve was inelastic then there would be a relatively small decrease in the number of licenses sold resulting from the increase in the license price. Alternatively, if the actual demand curve was the elastic curve then a much greater decrease in license sales would result from the price increase. It should be noted that the prices and demand responses shown in Figures 1.1 and 1.2a and 1.2b do not represent any expectation about the actual size of the price-quantity responses but are presented simply to illustrate the importance of understanding the shape of a demand curve before price changes are implemented.

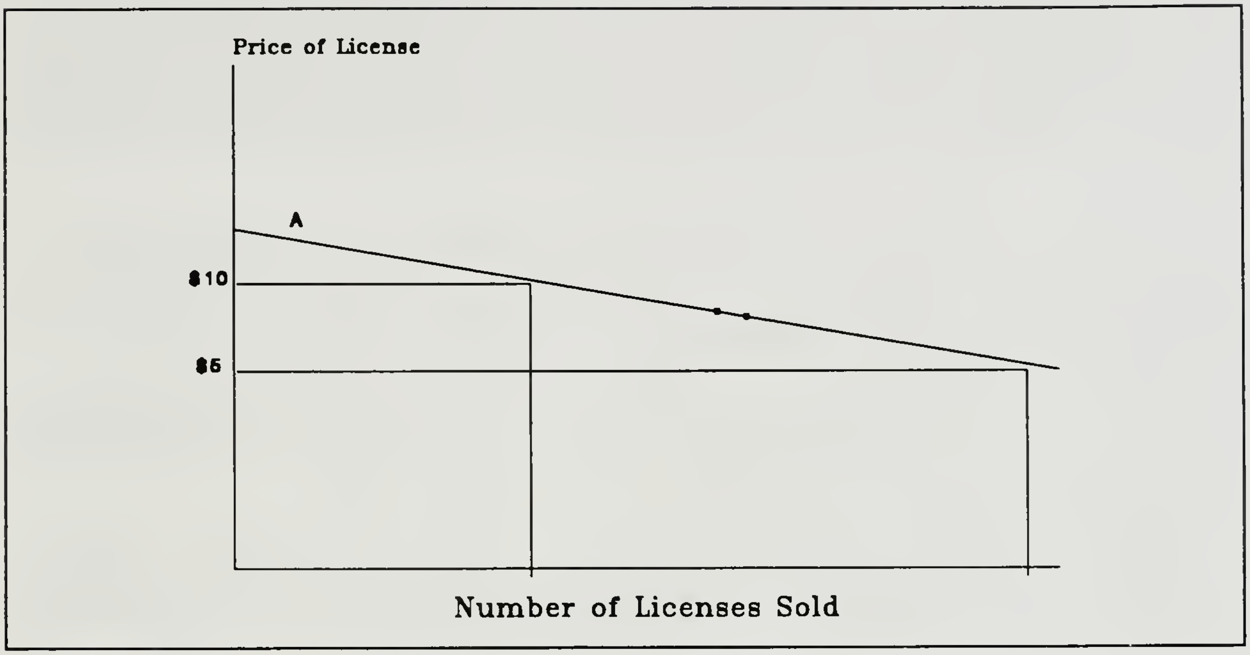


Figure 1.2a. Effect on Revenue of a Price Increase: Elastic Curve Case

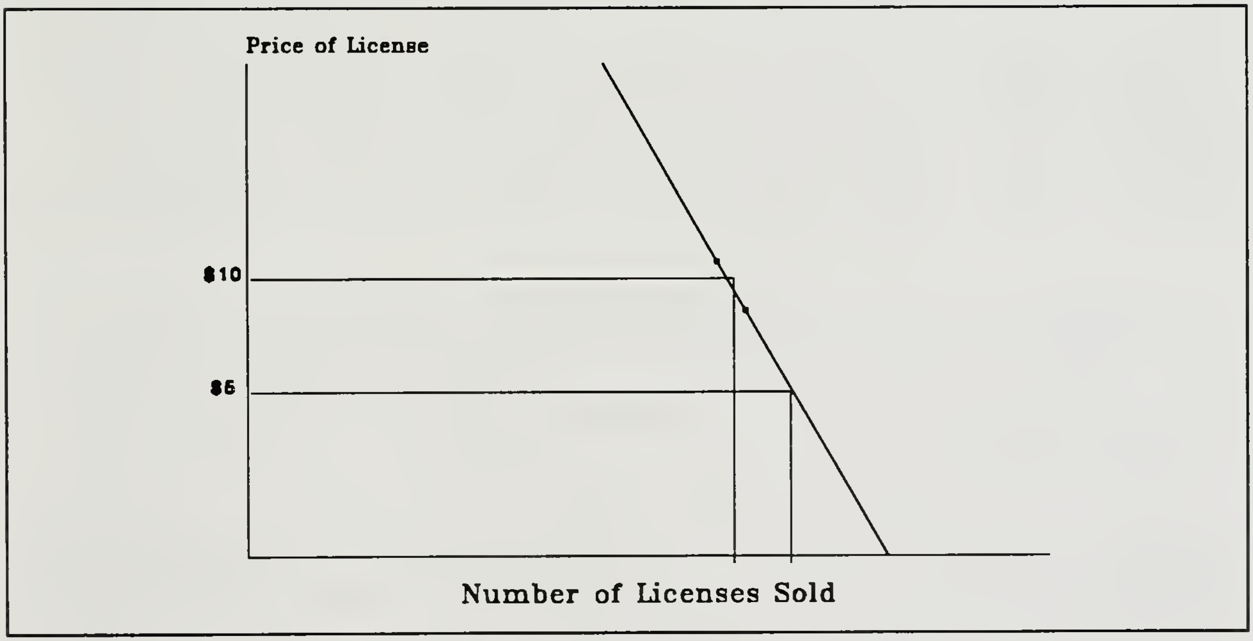


Figure 1.2b. Effect on Revenue of a Price Increase: Inelastic Curve Case.

The following analysis uses two formal models (the contingent valuation model and the travel cost model) to estimate the shape of the actual state lands license demand curve. Additionally, comparisons are made to two parallel markets (the demand for deer licenses in states west of the Mississippi, and the demand for Flathead Indian Reservation Recreation Licenses) to compare the results obtained in this study to similar market situations. We also discuss the extensive literature on the economics of outdoor recreation and examine prices for fee hunting and fishing in Montana

The purpose of the recreation use task is basically two-fold: 1) to learn about the pattern of newly permitted recreation use on state lands including type of activity, location, purpose, place of residence of recreationists, number of trips, and trip expenditures; and 2) to estimate a fair market value for this recreational use.

The first objective is served by surveying holders of state lands recreational licenses after they have taken trips to state lands. This objective was met by sampling approximately 4,000 license holders (see Appendix A for a copy of the survey instrument).

The second objective is a difficult one given that there are not well-established markets for recreational access in Montana or most of the western United States (Texas is the exception). We used two different approaches to provide different perspectives on the problem.

One approach used trip expenditure and trip frequency data from the survey to identify the shape of the demand curve for travel to state lands recreational sites in Montana. The specific model used is called a travel cost model - which basically uses travel expenditure as a spatially varying price. By examining how recreational use declines with increasing travel costs (and distance) from a site, one can infer how respondents would react to a site fee. There have been many applications of such a model to value recreational experiences, including studies in Montana of elk hunting (Duffield 1988) and trout fishing (Duffield, Loomis and Brooks 1987). A literature review is available in Ward and Duffield (1992), § 11.5.

The limitation of the travel cost model for the problem at hand is that what is being purchased (the state lands recreational license) is access to many sites over a year, rather than access to a given site for a given trip. To the extent that license holders visit only one site per year then the travel cost model of site demand can provide information on the demand for permits.

Another possible approach, and one which focuses more directly on the demand for multi-site/seasonal type permits, is contingent valuation. In contingent valuation, individuals are directly surveyed as to their willingness to pay for a given commodity. For the case at hand, individuals can be asked if they would purchase a state lands recreational use license if it cost another \$ X. The asking price amount is then varied across respondents. There is a very large literature on contingent valuation, as reviewed recently in Ward and Duffield (1992), Chapters 12 and 13. Studies specific to Montana include contingent valuation studies of

Montana fishing (Duffield and Patterson 1991), instream flows in the Upper Missouri River Basin of Montana (Duffield, Neher, Patterson and Allen 1990) and recreational use of the Big Hole and Bitterroot Rivers (Duffield, Neher and Brown 1992). The specific approach we follow in using CVM to estimate recreational demand and the associated potential revenue is similar to the methods in a study by Teasley and Bergstrom (1992). the latter study concerned revenue-capture from potential recreation users in Cherokee and George Washington National Forests in the S.E. United States.

2.1 Descriptive Statistics and Modeling

The information gathered from the DFWP conservation license holder survey is primarily of a descriptive nature. The survey instrument is relatively short (see APPENDIX A) and focuses on questions regarding primary uses of state lands, attitudes, and socioeconomic characteristics of the respondents.

The State Lands Recreational Use License data provide complete information on individual trips taken to state lands by individuals. Additionally, these data provide fairly complete information on respondents willingness to pay increased amounts for the recreational use license, and data on socioeconomic characteristic of the respondents.

2.1.1 Contingent Valuation Model and Travel Cost Model: Theory and Specification

The following section contains a brief discussion of the theoretical specifications of the CVM and TCM models estimated in Section 4 of this report. We use the CVM model to do two things: 1) estimate a demand curve for recreation permits as in Figure 1.1 and 2) estimate the value placed on these permits (so called "average willingness to pay"). The TCM model cannot be used to directly derive a demand curve, but is presented as an alternative estimate of the average value derived from permits. The two models specified herein are a dichotomous choice contingent valuation model and an individual observation travel cost model. The specifications of these models will be discussed in turn. This section is necessarily somewhat technical; some readers may want to skip to the results section.

We will briefly describe the theoretical motivation for dichotomous choice models. Hanneman (1984) provides both a utility difference approach and an alternative derivation based on the relationship of the individual's unobserved true valuation compared to the offered threshold sum (see also Cameron 1988). In the latter, it is assumed that if each individual has a true willingness-to-pay (WTP), then the individual will respond positively to a given bid only if his WTP is greater than the bid. For example, suppose that an individual is confronted with an offered price (t) for access to a given resource or recreational site. The probability of accepting this offer P(t), given the individual's true (unobserved) valuation WTP is then:

$$P(t) = Pr(WTP > t) = 1 - F(t)$$

where F is a cumulative distribution function of the WTP values in the population. In the logit model F(.) is the c.d.f. of a logistic variate and in the probit model F(.) is the c.d.f. of a normal variate. The specification of this model can be briefly illustrated for the case where the WTP values are assumed to have a logistic distribution in the population of interest conditional on the value of covariates. A statistical model is developed that relates the probability of a "yes" response to explanatory variables such as the bid amount, preferences, income, and other standard demand shifter type variables. The specific model is:

$$P(t;x) = [\ 1 + \exp(-at - b'\ x)]^{-1}$$

where P(t;x) is the probability that an individual with covariate vector **x** is willing to pay the bid amount t. The parameters to be estimated are *a* and b' (the constant term is included in **x**). The equation to be estimated can be derived as:

$$L = \ln[\ p\ /\ (1-p)\ ] = at + b'x$$

where L is the "logit" or log of the odds of a "yes" and p are observed response proportions. In application, the logit and probit models are so similar that it is difficult to justify one over the other on the basis of goodness of fit. We choose to work with the logistic specification here because the probit model does not lead to closed-form derivatives. Maximum likelihood estimates of the parameters in the preceding equation can be obtained with a conventional logistic regression program. We have utilized SAS (SAS Institute 1988). The welfare measure used in this study was the truncated mean of the willingness to pay distribution. Welfare measures and approaches for estimating the variance of these parameters are described in Duffield and Patterson (1991).

The TCM model used data from the most recently completed trip of each respondent to construct a statistical relationship between the number of trips taken to specific state land sites and the distance traveled to those sites. Theory suggests that the greater the distance one must travel to a site, the greater the costs incurred in visiting the site and, thus, the fewer the visits to that site.

The specific model used in this analysis was from a class of models known as "count" models. This application utilized a Poisson Semi-log functional form of the model. The general of the TCM model estimated below is:

$$Y = a + b_1 * TC + \mathbf{b}_i * \mathbf{x}_i$$

Where:

Y = Number of trips taken to a given site
TC = The reported travel costs to a given site
x_i = The vector of additional explanatory variables from 2 to i

2.2 Pilot Surveys

The first objective of this task was to develop final survey instruments which would gather the information necessary to describe state lands use patterns and to build models of that use. In order to ensure that the final survey instruments adequately gathered the required information, pilot surveys for both the conservation license sample and the DSL license sample were implemented in July and August, 1992.

The names of 326 Montana state lands recreation license holders were drawn for the pilot surveys along with the names of 205 individuals who held DFWP conservation licenses. Conservation licenses are a prerequisite to purchasing a Montana hunting or fishing license. Attempts were made to contact the holders of these licenses during late July and early August 1992. The responses to these surveys were analyzed in order to determine whether the survey instruments adequately gathered the information necessary to estimate net willingness to pay for access to state lands. Where necessary, changes were made in the final survey instruments. The main finding of the pilot survey was that the main reason people bought the state lands recreation license was to hunt. Because the majority of license holders were hunters, the authors chose to implement the DSL recreational license sample after the end of the general big game hunting season. It was also decided to conduct the survey as soon as possible after the hunting season in order to minimize the potential problems associated with recall bias on the part of the respondents.

2.3 Phone Survey Design and Methods

Based on the results of the pilot survey, final surveys were developed for both the conservation license sample and the state lands license sample.

The final conservation license sample phone survey was designed to efficiently gather the following information: if and for what purpose the respondent purchased a DSL recreational use license, if and why they plan to purchase one next year, why they did not purchase one (if applicable), and information on recreation preferences and socioeconomic characteristics.

A desired sample for the conservation license survey was initially set at approximately 600 completed surveys. In order to assure this final sample size of responses, a sample of approximately 1000 names was drawn from the large population of conservation license holders (271,924 residents and 164,819 nonresidents as of December 31, 1992).

The final State Lands Recreational Use license survey was designed to gather sufficient information to allow the estimation of 2 models: a contingent valuation model of willingness to pay increased license costs, and an individual observation travel cost model of net willingness to pay for use of state lands.

A desired sample size of 2000 surveys for the Montana state lands recreational use license survey was initially set. In order to achieve this final sample size, approximately 4000 licenses were drawn from the November 30th sample of 28,450 licenses.

3.0 DATA COLLECTION

3.1 Survey Administration

The conservation license holder survey was administered by Bioeconomics, Inc. in Missoula. A total of 9 interviewers were involved in the phone surveying.

A sample of 660 resident conservation license holders was drawn by computer in Bozeman, Montana. This sample was drawn by DFWP statistician, Bob McFarland, on November 20, 1992. A second sample was drawn from the population of nonresident conservation license holders on November 20th at DFWP headquarters in Helena. This sample was drawn by hand from drawers containing copies of licenses remitted to DFWP from vendors throughout Montana. The hand-drawn sample contained 450 names of nonresident conservation license holders.

Individuals in this sample were contacted between November 24th and January 8th. A total of three attempts were made to contact the individuals. Calls were made between 5:30 and 9:00 pm on weekday nights and between 9:00am and 9:00 pm on weekend days.

Completed surveys were returned to Bioeconomics, Inc. in Missoula and were keyed into a computer at that location.

The State Lands Recreational Use license survey was also administered by Bioeconomics, Inc. For this more intensive survey effort 13 surveyors from Missoula and 6 from Helena were involved.

A sample of 3867 DSL surveys were drawn from the files of surveys kept at DFWP headquarters in Helena between the dates of Dec 10th and Dec. 18th. The Names and phone numbers drawn were entered into a data base in Missoula and printed "contact-cards" were distributed from there to the interviewers. License holders were contacted from December 14th and January 25th. As with the Conservation license surveys, the completed surveys were returned to Bioeconomics, Inc. in Missoula and were entered into a data base there.

3.2 Response Rates

3.2.1 Conservation License Sample

The total sample for this survey was 1067 holders of 1992 Montana DFWP conservation licenses. The cooperation rate was very high at 98%, and the completion rate was 66.6% (see Table 3-1 for definitions). These responses rates are high for a phone survey and indicate that the issue was relevant and of interest to respondents and that survey administration and practices adhered to high professional standards.

Table 3.1. Disposition of Sample Response Categories for Conservation License Holder Survey.

Category	Conservation License Sample
Potential Respondents	
Completed Interviews	598
Refusals	12
Unable to Reach / Answering Machine	282
Subtotal	892
Excluded from Sample	
No number/wrong number/not working/ deceased	175
Total Original Sample Size	1067
Completion Rate	66.6 %
Cooperation Rate	98 %

Note: The completion rate is the ratio of the number of completed interviews to the total number of potential respondents. The cooperation rate is the ratio of the number of completed interviews to the total number of completed and refused interviews.

3.2.2 Recreation License Survey

A total sample of 3867 licenses were drawn for this survey. The completion rate for this sample was a very high 76.4% and the cooperation rate was 98.3%.

Table 3.2. Disposition of Sample Response Categories for Montana Department of State Lands Recreational Use License Survey.

Category	Recreational Use License Sample
Potential Respondents	
Completed Interviews	2384
Refusals	41
Unable to Reach / Answering Machine	697
Subtotal	3122
Excluded from Sample	
No number/wrong number/not working/ deceased	745
Total Original Sample Size	3867
Completion Rate	76.4%
Cooperation Rate	98.3%

Note: The completion rate is the ratio of the number of completed interviews to the total number of potential respondents. The cooperation rate is the ratio of the number of completed interviews to the total number of completed and refused interviews.

4.0 RESULTS

The results of the recreational uses of state lands analysis are presented in this section. Section 4.1 presents the primarily descriptive results of the DFWP conservation license survey. Section 4.2 details the descriptive statistics from the DSL recreation license survey along with the results of the contingent valuation (CVM)and travel cost (TCM) models. Section 4.3 presents 2 analyses of parallel recreation markets for comparison to the results from the CVM and TCM modeling efforts.

4.1 Results of the Conservation License Survey

4.1.1 Overview of Descriptive Statistics

The main survey results are presented in this and the following sections. Variable frequencies and means can be found in Appendix B.

An analysis of responses to the conservation license survey shows that in it's first year of operation the DSL recreational use license program is not particularly well known, and in many cases not well understood. Responses to Questions 3 and 4 of the survey illustrate this. Question 3 asked: "Are you aware that recreationists can now access lands administered by DSL by purchasing a Montana State Lands Recreation License?" Only 55.8% of conservation license holders knew that such a license existed. The following question, Question 4, asked: Did you purchase one of these Montana State Lands Recreation Licenses in 1992? Responses to this question were quite surprising as 29.9% of respondents said that they had purchased the license. In fact, based on conservation license sales through December 31, 1992 and DSL licenses through November 30, 1992 only 6.5% of conservation license holders actually bought the DSL license. The disparity in percentages suggests that many conservation license holders may have been unsure if there was a difference between the DSL license and the conservation license itself. Whatever the source of misunderstanding, it seems that many more respondents to the survey of conservation license holders thought that they had purchased a DSL license than actually had done so.

The 1992 Montana State Lands Recreation License allowed the holder to engage in hunting and fishing on previously inaccessible state lands. Respondents who reported purchasing a DSL license were asked why they purchased the license. Figure 4.1 shows a breakdown of their responses. Nearly 70% of those who reported buying a 1992 DSL license said that their main reason for doing so was in order to hunt on those lands. A much smaller percentage of respondents (27.3%) reported their major reason to be for fishing. Finally 5 respondents (2.9%) reported "other" reasons for purchasing the license.

Respondents who reported that they did not buy a DSL license in 1992 were asked whether they intended to do so in 1993. In all, 53.8% said that they would purchase the license in 1993. This relatively large proportion indicates that the better informed the public is regarding the state lands license and its uses, the higher the proportion of sportsmen who can be expected to purchase them.

Reasons given for intending to buy the DSL license in 1993 were quite similar to those given for purchasing a 1992 license: 75% for hunting, 20.6% for fishing, and 4.4% for other uses.

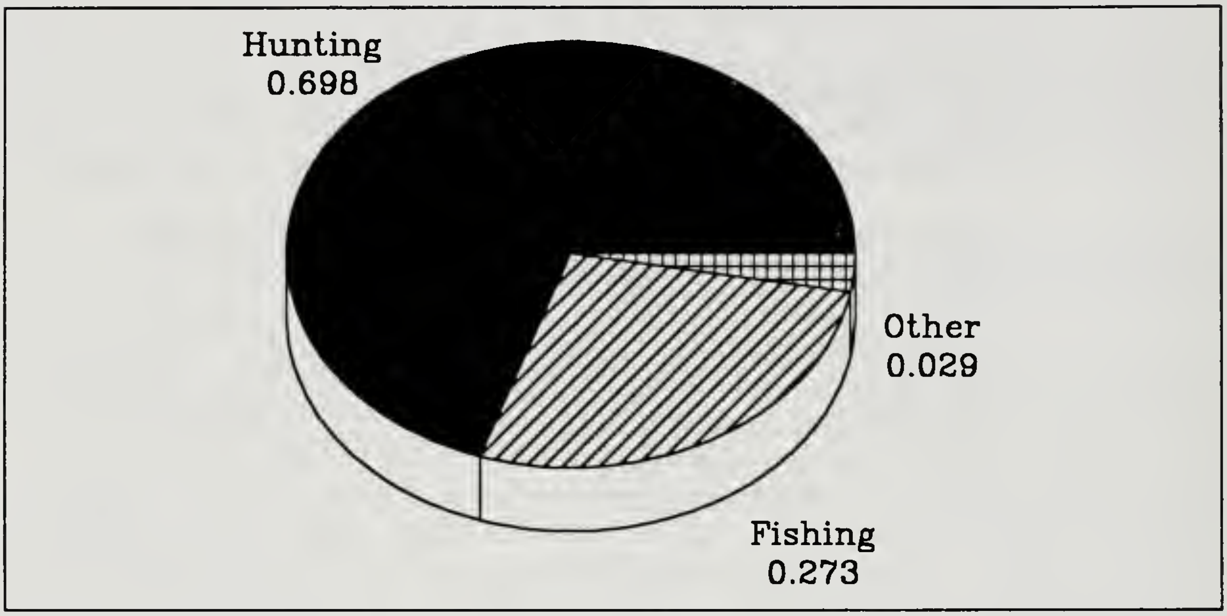


Figure 4.1. Primary Purposes for Purchasing a 1992 Montana State Lands Recreational Use License.

In this initial year of the DSL recreational use license program the only recognized uses for the license were for hunting and fishing. Respondents who did not purchase a 1992 DSL license were asked if they would have purchased one if, in addition to hunting and fishing, it also gave them the right to access state school trust lands for hiking, wildlife observation, or berry picking. In all, 20.6 % of those who reported not purchasing a license said that they would have purchased a 1992 license under these conditions.

Two more questions were asked of respondents who did not purchase a 1992 Montana State Lands Recreation License. They were first asked what the main reason was that they did not purchase the license. Figure 4.2 shows a breakdown of reasons given for not purchasing the license. Nearly 43% of respondents reported that they did not purchase a license because they either "don't hunt" or "will not use state lands". Another 33.6% said they did not purchase because they did not know about the issue. Of the remaining respondents, 6.5% protested the license, claiming it was a "rip off" and 16.1% gave "other" reasons for not purchasing. Of the "other" reasons given, the vast majority (75.8%) were for reasons unrelated to familiarity with the issue or protest of the issue. The reasons given generally included lack of opportunity this year and lack of understanding of the issue.

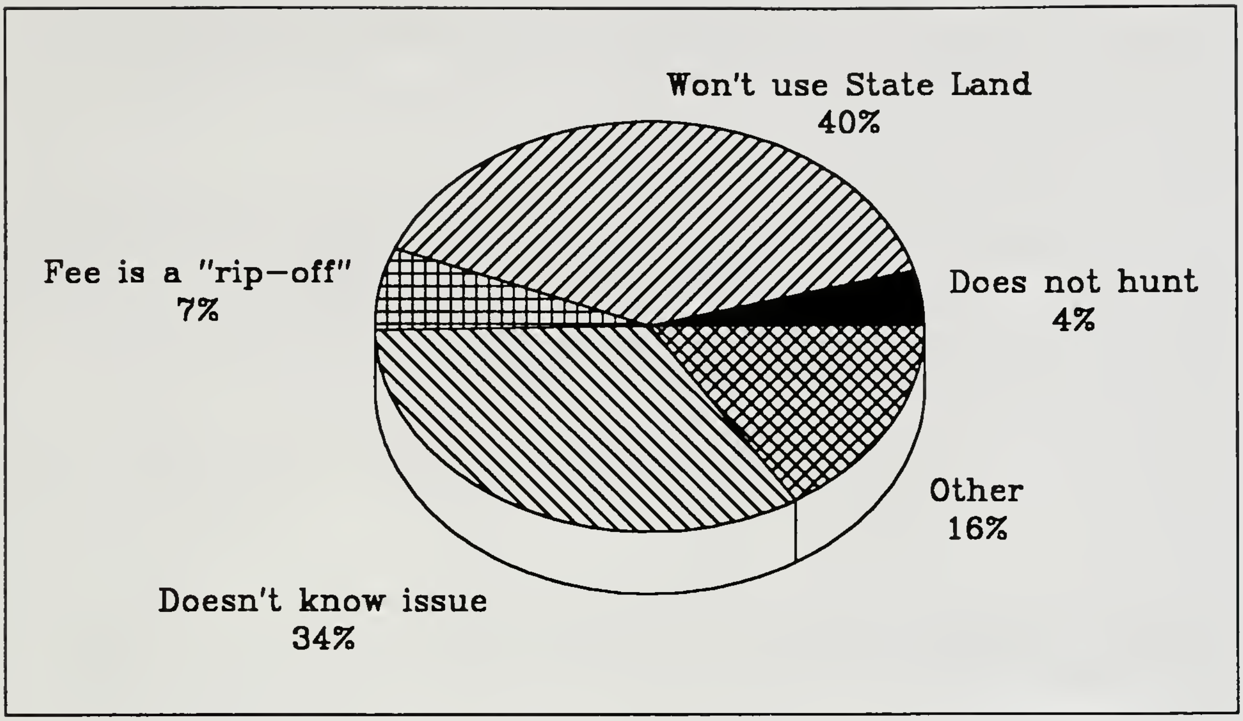


Figure 4.2. Distribution of Reasons Given for Not Purchasing a Recreational Use License.

Alternative approaches to forecasting the number of DSL licenses which could be sold is shown in Table 4.1a. Section 1 of Table 4.1a predicts the number of licenses which would be sold in 1993 if the public were fully informed about the availability of the licenses, when and where they were required, and what activities and lands were being licensed. The numbers in this table were derived with the understanding that a much higher proportion of the conservation license sample believed they had purchased a DSL license than actually had done so. With this in mind, ratios were developed under the assumption that the relationship between the responses given in the survey were valid. Part (a) of Section 1 examines the high-end case for prediction; specifically, the entire sample of respondents. Part (b) presents a conservative, low-end, prediction. This ratio considers only those respondents who gave as a reason for not buying a 1992 DSL license that they did not know about the issue. The range of predictions from these two ratios is quite broad ranging from a low-end prediction of 45,567 to a high-end prediction of 75,174.

Section 2 of Table 4.1a presents predictions of what 1992 DSL license sales would have been had activities in addition to fishing and hunting been allowed of licensees. These additional activities included hiking, wildlife observation and berry picking. As in Section 1, part (a) predicts the high-end license sales considering the entire respondent sample. Part (b) shows the low-end case, considering only respondents who cited their reason for not purchasing a DSL license as that they did not fish or hunt. The predictions for this scenario range from a low of 30,647 licenses to a high of 45,202 licenses. It should be noted that the section 2 results are based on quite limited samples and therefore necessarily provide only general indications about the magnitude of license sales increases.

Table 4.1a. Forecast of State Lands License Sales.

Item	Resident	Nonresident	Total
1. Predicted sales in 1993 if no change in price and public is fully informed about the availability of licenses.			
a) High case: all respondents			
ratio: would purchase next year / purchased this year	2.79	1.75	2.64
b) Low case: subsample of respondents saying the reason they did not purchase is that they did not know about the license			
ratio: would purchase next year / purchased this year	1.64	1.37	1.60
c) Predicted sales in 1993 if fully informed and no price change			
Current sales	24,410	4040	28,450
Low prediction	40,032	5535	45,567
High prediction	68,104	7070	75,174

Table 4.1a continued. Forecast of State Lands License Sales.

Item	Resident	Nonresident	Total
2. Effect on DSL license sales in 1992 of including other recreation activities such as hiking, wildlife observation, or berry picking.			
a) High case: all respondents			
ratio: would purchase next year / purchased this year	1.63	1.34	1.59
b) Low case: subsample of respondents saying the reason they did not purchase is that they do not hunt or fish			
ratio: would purchase next year / purchased this year	1.09	1.00	1.08
c) Predicted sales in 1992 if license included other recreational uses besides hunting and fishing			
Current sales	24,410	4040	28,450
Low prediction	26,607	4040	30,647
High prediction	39,788	5414	45,202 1

Those who did not purchase a license were asked whether the respondent would have purchased the license had it only cost $3.00 rather than $5.00. Of those asked this question, 33.9% responded "yes" and 66.1% "no".

In addition to the questions asked about the State Lands Recreational Use License, respondents were asked a number of socioeconomic questions. The frequencies and mean responses for these survey questions are detailed in the frequencies and means in Appendix B. The mean statistics are broken out by residency status with a 1 being a resident and a 0 being a nonresident.

Several comparative statistics for residents and nonresidents are presented in Table 4.1b. This table shows some differences in awareness of the license program, socioeconomic variables, and attitudes toward fishing and hunting between the two residency groups.

Table 4.1b. Comparison of Resident and Nonresident Responses to Attitude and Socioeconomic Questions of Conservation License Holders.

Statistic	Resident Response	Nonresident Response
% Aware of license program	64.6 %	42.2 %
% Male	76.8 %	93.7 %
% Belonging to a conservation organization	29.4 %	52.0 %
% who rate hunting as their favorite or one of their favorite activities	60.9 %	77.5 %
% who rate fishing as their favorite or one of their favorite activities	70.3 %	71.9 %
Average age	40.75 years	44.8 years
Average family income (1991)	$ 31,942	$ 49,438

4.2 State Lands Recreation License Survey

4.2.1 Descriptive Statistics of Respondent Trip and Socioeconomic Characteristics

The second survey interviewed individuals who actually had purchased a 1992 DSL recreational use license. The Montana state lands recreational use license survey gathered extensive information on the respondents: characteristics of the trips they took, their perceptions about the uniqueness of a state lands recreational experience in their area, and their socioeconomic characteristics. Appendix A contains a copy of the survey instrument used, and Appendix B contains variable means and frequencies for the sample, by residency status.

Table 4.2 presents a number of selected trip and socioeconomic characteristics for residents and nonresidents. In general, the differences between the statistics for Montana residents and nonresidents are as would be expected; residents take more trips, shorter trips, and cheaper trips than do nonresidents; nonresidents had a higher success rate on their last trip, use outfitters at a much higher rate, are more likely to belong to a hunting or conservation organization than are residents; Finally, nonresidents have a higher family income level than do residents. Figure 4.3 shows a comparison of the primary purpose cited by respondents for their last trip to Montana state lands. By far the most frequently cited purpose was to hunt deer or elk. These species were combined in Figure 4.3 due to the large number of respondents who hunted these species jointly.

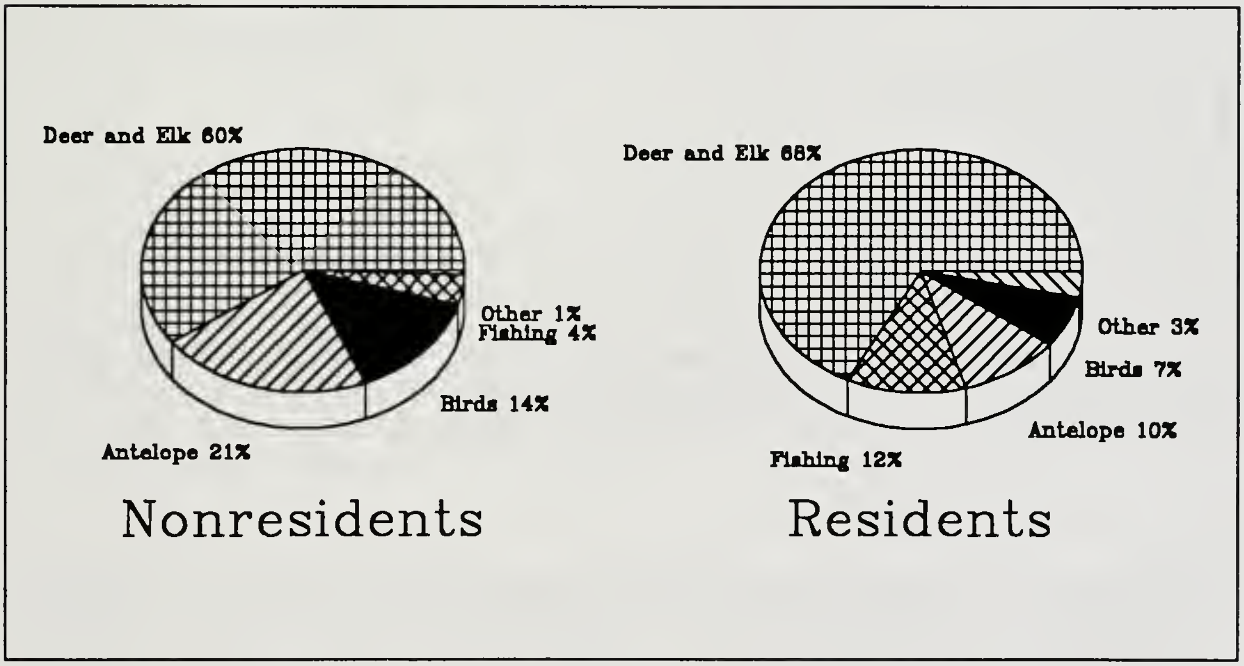


Figure 4.3. Distribution of Types of State Lands Trips Taken, by Residency.

Table 4.2. Descriptive Statistics for DSL Recreational Use License Holders.

Statistic	Residents	Nonresidents
Average number of trips to state lands	2.10 trips	0.98 trips
Average number of days on most recent trip to state lands	2.54 days	9.08 days
% of hunters who bagged game on most recent trip	48.6 %	77.8 %
Average number of miles traveled one-way on last trip	87.7 miles	1232 miles
Average amount spent on last trip	$ 88.37	$ 1445.40
% using an outfitter on last trip	2 %	32.2 %
Average age	40.9	43.1
% belonging to a conservation or hunting organization	37.7 %	68.1 %
Average 1991 family income	$ 34,525	$ 56,103

Note: The % of hunters who bagged game on their most recent hunt includes those who were on bird hunting trips as well as on big game hunting trips. Additionally, it should be noted that this question was asked of their last trip to state lands. This trip is more likely to be a "successful" hunt than would be a randomly determined hunt to state lands.

Table 4.2b shows a comparison of respondent's reported hunting success rates to selected statewide deer and elk success rates. Both the deer harvest statistics reported in Duffield and Neher (1990) and the elk harvest statistics reported in Allen (1988) are for the respondent's most recent elk or deer hunting trip. This is the same question format as was on the DSL survey, which ask about the respondent's most recent trip to state lands.

Table 4.2b also shows the 1987 Montana deer, elk, combined deer and elk, and antelope success rates as calculated by DFWP. Note that the Allen and the Duffield and Neher estimates are slightly lower than the DFWP estimates. This shows that success rates tend to be lower for a respondent's last trip than for their entire season. Additionally, we would expect that the success ratios from the respondent's last trip to state lands would be lower than that from their last trip to any Montana lands. Given the sources of downward bias on the DSL success ratios, it appears that state land deer and elk hunting quality (as measured by success rates) is comparable to that of deer and elk hunting lands in the rest of Montana. It should finally be noted that due to this success rate comparison being between 1987 and 1992 seasons, the conclusions drawn are necessarily of a general nature.

Table 4.2b. Comparison of Deer and Elk Hunting Success Ratios Between DSL lands and Montana lands in General, by residency and Species.

Survey	Deer Hunting Success Rates		Elk Hunting Success Rates		Combined Deer & Elk Success Rates		Antelope Success Rates	
	Res.	Non-res.	Res.	Non-res.	Res	Non-res	Res.	Non-res.
Respondent reported deer and elk success rates for the last trip taken to any Montana lands, 1987 hunting season								
DFWP (1988)	66%	71%	23%	24%	49.8%	52.6%	75%	76%
Allen (1988)	--	--	17%	20%	--	--	--	--
Duffield and Neher (1990)	63.9%	68.8%	--	--	--	--	--	--
Respondent reported deer and elk success rates for the last trip taken to state administered lands, 1992 hunting season.								
DSL (1992)	--	--	--	--	45.9%	70.4%[1]	63%	97%[1]

[1] note that the percentage of nonresidents employing an outfitter in the DSL sample was substantially higher than the general Montana average (32% for DSL, 25% for Montana (Duffield and Neher, 1990)). This difference may tend to inflate the nonresident success rates for the DSL sample.

Table 4.3 shows the number of Montana resident survey respondents from each Montana county. Perhaps the most notable statistic presented in this table is the high percentage of DSL recreation licenses sold to residents of Flathead County. Also shown in Table 4.3 is a population weighted ratio of the number of licenses in the sample, by county. If a county were to have a number of licenses directly proportional to the population of that county then the value of this ratio would be 1.00. Values above 1 indicate that the county is above average in the percentage of it's population which buys DSL licenses. Ratios less than 1 indicate that per capita license purchases are below average.

Table 4.3. Ranking of Montana Counties by the Number of Survey Respondents Coming from that County.

Rank	County	# Licenses	Ratio[1]	Proportion of Sample
1	FLATHEAD	512	3.56	0.265
2	YELLOWSTONE	174	0.63	0.090
3	MISSOULA	171	0.90	0.089
4	LEWIS AND CLARK	129	1.12	0.067
5	CASCADE	89	0.47	0.046
6	GALLATIN	68	0.56	0.035
7	RAVALLI	62	1.02	0.032
8	HILL	52	1.22	0.027
9	LINCOLN	42	0.99	0.022
10	FERGUS	36	1.23	0.019
11	SILVER BOW	36	0.44	0.019
12	VALLEY	34	1.70	0.018
13	BEAVERHEAD	33	1.62	0.017
14	RICHLAND	30	1.16	0.016
15	SANDERS	27	1.29	0.014
16	DEER LODGE	23	0.92	0.012
17	JEFFERSON	23	1.20	0.012

Rank	County	# Licenses	Ratio[1]	Proportion of Sample
18	TETON	23	1.51	0.012
19	PARK	21	0.60	0.011
20	CUSTER	19	0.67	0.010
21	ROOSEVELT	19	0.71	0.010
22	DAWSON	18	0.78	0.009
23	POWELL	17	1.06	0.009
24	SHERIDAN	17	1.48	0.009
25	BROADWATER	16	1.99	0.008
26	CHOUTEAU	16	1.21	0.008
27	FALLON	15	1.99	0.008
28	LAKE	14	0.27	0.007
29	MADISON	14	1.09	0.007
30	MEAGHER	14	3.18	0.007
31	PRAIRIE	14	4.18	0.007
32	ROSEBUD	14	1.29	0.007
33	CARBON	11	0.56	0.006
34	JUDITH BASIN	11	1.99	0.006
35	TOOLE	11	0.90	0.006
36	GLACIER	10	0.34	0.005
37	PONDERA	10	0.64	0.005
38	BLAINE	9	0.55	0.005
39	DANIELS	9	1.64	0.005
40	WHEATLAND	8	1.47	0.004
41	GRANITE	7	1.13	0.004
42	STILLWATER	7	0.44	0.004

Rank	County	# Licenses	Ratio[1]	Proportion of Sample
43	MCCONE	6	0.96	0.003
44	MINERAL	6	0.75	0.003
45	MUSSELSHELL	6	0.60	0.003
46	POWDER RIVER	6	1.18	0.003
47	BIG HORN	5	0.18	0.003
48	CARTER	4	1.10	0.002
49	PHILLIPS	4	0.32	0.002
50	SWEET GRASS	4	0.52	0.002
51	GARFIELD	2	0.52	0.001
52	LIBERTY	2	0.36	0.001
53	WIBAUX	2	0.69	0.001
54	GOLDEN VALLEY	1	0.45	0.001
55	PETROLEUM	1	0.79	0.001

[1] The population weighted sales ratio was calculated as follows:

$$\mathit{RATIO} = \frac{\dfrac{\text{county license sample}}{\text{total license sample}}}{\dfrac{\text{population of county}}{\text{population of state}}}$$

Figures 4.4 and 4.5 show how the sales of state lands recreational use licenses in our sample was distributed across the state of Montana. Figure 4.4 shows a general surface plot of the total number of respondents to our survey who were from each county. Responses were received from all but one county (Treasure). Figure 4.4 gives the reader a general impression of the distribution of license sales across Montana. The peaks represent the comparable number of responses from each county. Most striking from this graph (as well as from Table 4.3, above) is the large concentration of license holders living in Flathead County. Additionally, large peaks can be seen in the other major population centers of Missoula, Lewis and Clark, Yellowstone, and Cascade Counties.

While Figure 4.4 conveys an interesting picture of the absolute distribution of state lands licenses in Montana, it is also very interesting to note what this distribution looks like relative to the distribution of population in Montana. Figure 4.5 shows this population weighted distribution for the 6 counties which had a significantly high number of licenses per capita ratio (ratio > or = to 1.99). These 6 counties are located in three areas of the state. In the northwest is Flathead County with its large share of the total number of licenses sold in the state. In central Montana 3 contiguous counties, Broadwater, Meagher, and Judith Basin have significantly high per capita sales. Finally, in Eastern Montana Prairie and Fallon Counties have high license sales to population ratios.

Figure 4.4. Distribution of License Sample in Montana
by County

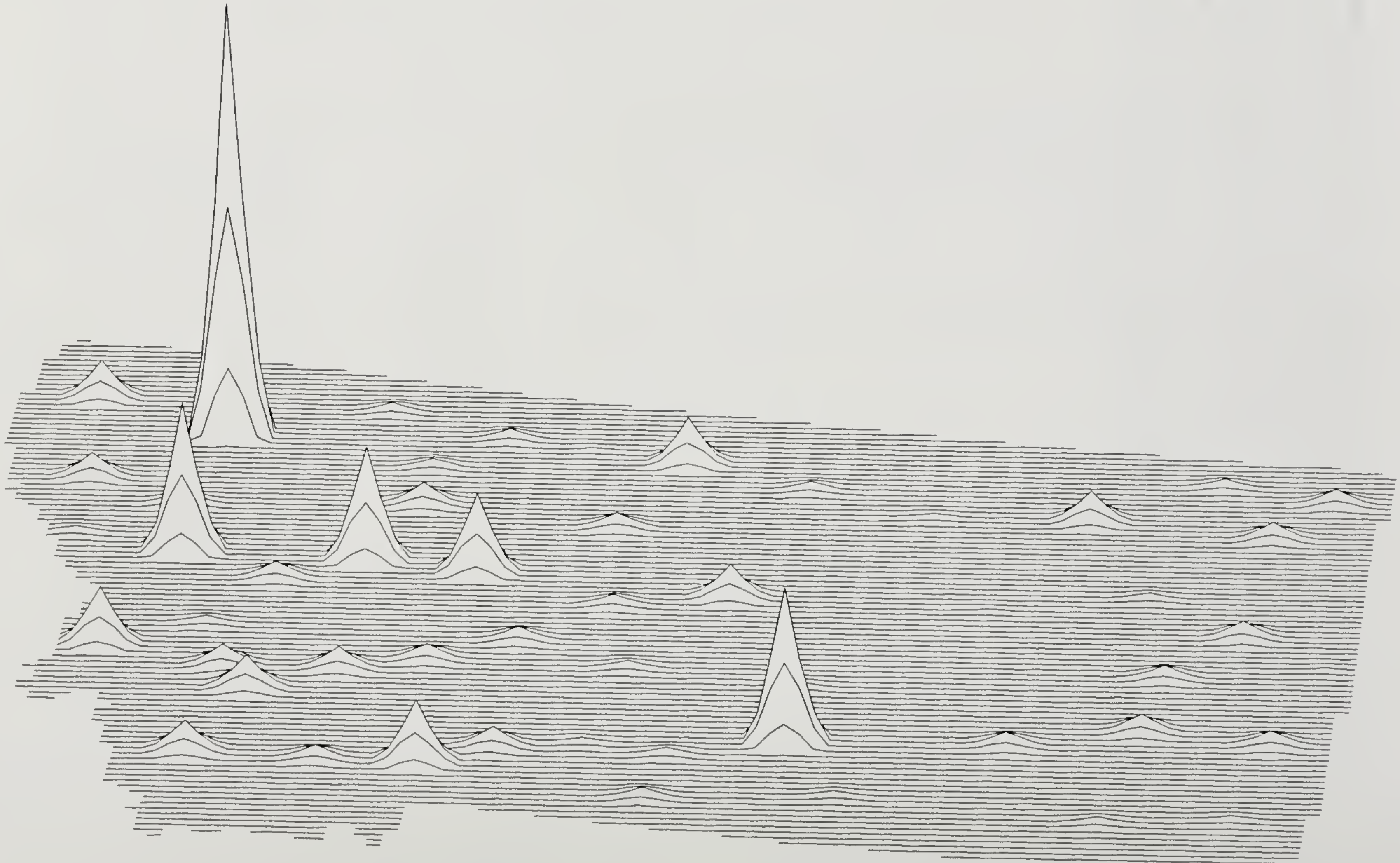
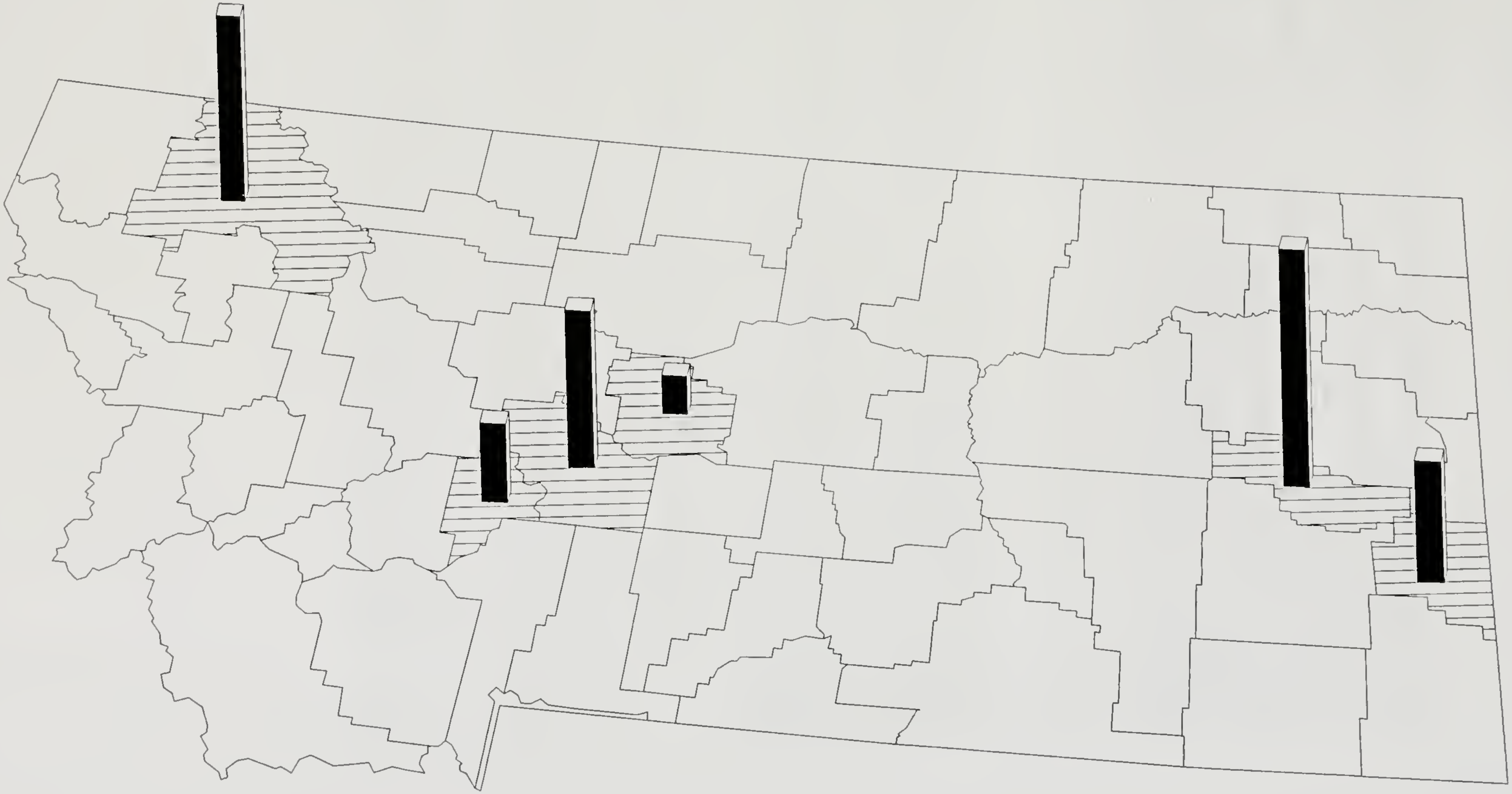


Figure 4.5. Population Weighted License Sales

Counties with Sales > 2 * Average



4.2.2 Contingent Valuation and Travel Cost Modeling of Montana State Lands Recreational Use License Survey Data

Estimation of the fair market value of a Montana State Lands Recreation license was made using two independent approaches. Net willingness to pay for the recreation license was estimated first through responses to a contingent valuation question. Secondly, net willingness to pay was estimated through the use of an individual observation travel cost model. A somewhat technical discussion of the models can be found in Section 2.2 above. A discussion of the estimated models and their implications follows.

4.2.3 Contingent Valuation Model

The specific contingent valuation method used in this study was dichotomous choice. In this question format, respondents are faced with a fixed bid amount and reply "yes" or "no" as to whether they would be willing to pay that amount for the resource or right in question.

The Montana Department of State Lands recreation license survey contained 2 questions designed to elicit willingness to pay information from respondents. This information was then used to estimate a statistical model of willingness to pay. The first contingent valuation (CVM) question asked:

> Considering the use that you will usually make of your State Lands Recreational Use License, would you choose to buy this license even if it cost _\$ XX_ ?

The values (XX), known as the bid amounts, were varied from respondent to respondent. The survey was designed so that an approximately equal number of respondents would be asked each of the following bids: \$10, \$15, \$20, \$25, \$30, \$50, \$100. An additional \$200 bid level was included for nonresident respondents. The responses to this question were used to statistically construct a demand curve for the DSL license.

A follow-up question was asked of those who responded "no" to the CVM question. This question asked for the reason the respondent would not purchase the license at the stated X price. Responses to this question are discussed below.

4.2.4 Contingent Valuation Results

The responses to the contingent valuation questions were analyzed for both Montana residents and nonresidents. Table 4.4 shows the percentage of residents and nonresidents who responded "yes, would purchase the DSL license at this price" to each of the alternative bid levels.

The basic finding is that the percentage of respondents who would buy the DSL license declines as the bid price increases. This is consistent with the economic law of demand. It can be seen that a higher proportion of nonresidents answer "yes" to each bid level than do residents. For example, at a bid level of ($50) 47.4% of nonresidents compared to 13.1% of residents responded "yes". This may be because nonresidents have, on the average, higher incomes or are more avid hunters or anglers.

Table 4.4. Percentage of Respondents Answering "Yes" to Alternative Bid Levels, by Residency.

Bid Level	Residents	Nonresidents
10	0.462	0.714
15	0.291	0.660
20	0.246	0.686
25	0.239	0.512
30	0.197	0.592
50	0.131	0.474
100	0.063	0.273
200	--	0.059
Sample Size	1866	324

These observed frequencies of "yes" responses were used to estimate a logistic regression model of the data. Estimated models are shown in Table 4.5. The goodness-of-fit statistics show both the resident and the nonresident models to provide a good fit to the actual data. Figures 4.6 shows plots of the actual and the predicted percentage of "yes" responses as derived from the models. It can be seen that the resident model provides a very close fit of predicted to actual responses to the CVM bid levels. The nonresident model also provides a close fit to the actual nonresident responses.

Table 4.5. Estimated Contingent Valuation Models of Willingness to Pay for Increased License Costs, by Residency.

Variable/Statistic	Resident Model	Nonresident Model
Intercept	2.145 (7.33)**	3.233 (5.81)**
ln(BID)	-1.052 (-11.08)**	-0.910 (-5.44)**
D.F./Chi-Square	5 / 4.23	6 / 5.20
p-value	0.516	0.519
Sample Size	1866	324

Note: t-stats marked with ** are significant at the 95% level of confidence.

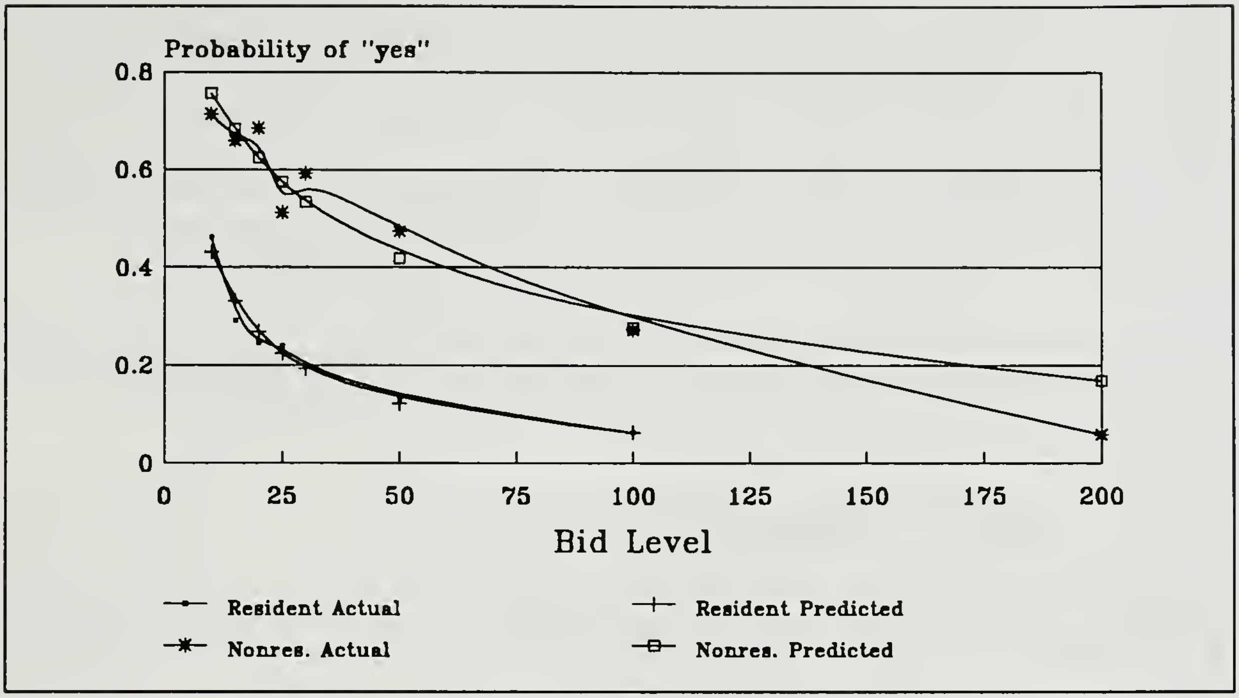


Figure 4.6. Comparison of Actual and Predicted proportion of "Yes" Responses, by Residency.

4.2.5 Contingent Valuation Estimates

The estimated models shown above were used to calculate willingness to pay for the recreational use license. This mean willingness to pay represents the average value recreationists would be willing to pay for the DSL license based on the model which was estimated. Mean willingness to pay is the average of the maximum amount each individual would be willing to pay rather than do without the permit. This value is used by economists to measure the net benefits (over and above costs) associated with a given activity. Note that average willingness to pay is different than a market price.

Table 4.6 shows the willingness to pay estimates for the two residency groups. Not surprisingly, nonresidents have a higher estimated net willingness to pay than do residents. This makes sense in light of the fact that many nonresidents travel large distances and spend large amounts of money on their hunting and fishing trips to Montana. For these individuals the cost of a DSL license, even at $100 or $200, is a small portion of their costs and is unlikely to be weigh heavily in their decisions of whether to recreate in Montana.

At this point it is important to comment briefly on the validity of the CVM method used in this analysis. The key measure of validity for CVM models, such as the one employed here, is how closely the willingness to pay estimates derived from the models would correspond to actual market-determined levels, were they available. In order to test the validity of CVM estimates, simulated markets for traditionally nonmarketed goods (such as special draw deer tags) have been constructed in order to compare CVM willingness to pay with a market-based willingness to pay measure for the same good. Bishop and Heberline describe several such market experiments conducted in Wisconsin (Ward and Duffield 1992). They found that for many willingness to pay CVM measures (most notably for the dichotomous choice CVM method used in this study) there was not a significant difference between the CVM estimated willingness to pay and the simulated market derived willingness to pay.

Bishop and Heberline's findings support the validity of carefully estimated CVM models for valuation of recreational experiences. The evidence tends to show that respondents to CVM questions concerning these types of activities generally provide valid responses.

Table 4.6. Mean Net Willingness to Pay Estimates for Residents and Nonresidents.

Statistic	Resident Sample	Nonresident Sample
Mean Net Willingness to Pay[1]	$ 19.46	$ 68.92

[1] The mean estimates were truncated at the maximum bid level of $100 for residents and $200 for nonresidents.

4.2.6 CVM Derived Demand Curve

The observed responses to the CVM question (shown in Table 4.4) can be used to estimate the demand curve for Montana state lands use licenses. This is done by utilizing a combination of known information (that through November 30, 1992 28,450 licenses were sold at a price of $5) and contingent valuation response information (the percentage of individuals who responded that they would purchase a license at each level above $5. i.e., $10, $15, $20, etc...). Figure 4.7 shows the derived demand curve for Montana residents for the state lands recreational use license.

Figure 4.7 shows that the response of sales to changes in the price of the license depends greatly on what point one begins from on the demand curve. At low price levels (e.g., $5) there is a much greater decrease in sales associated with a small increase in the license price. A measure of the responsiveness of changes in sales to changes in price is called the price elasticity of demand. This can be calculated for discrete price changes as:

$$\eta = \frac{\Delta Q / (.5) * (Q_1 + Q_2)}{\Delta P / (.5) * (P_1 + P_2)} = \frac{\Delta Q \ (P_1 + P_2)}{\Delta P \ (Q_1 + Q_2)}$$

Where: η = Price elasticity of demand
ΔQ = The change in the quantity sold
ΔP = The change in the price
Q_1 = The original quantity sold
Q_2 = The quantity sold after the price change
P_1 = The original price level
P_2 = The changed price level

This specific formula is sometimes referred to as the "arc elasticity" of demand for a given discrete price change. If the price elasticity of demand is greater in absolute value than -1.00 (e.g., -1.50) then an increase in price will bring about a decrease in total revenue. At elasticities less in absolute value than -1.00 (such as -0.50) an increase in price will result in an increase in total revenue. At an elasticity equal to -1.00 (so called unitary elasticity) changes in price will result in no change in total revenue.

The elasticity of the demand curve shown in Figure 4.7 was calculated for 2 portions of the curve, from $5 to $25 and from $25 to $50. Over the interval of $5 to $25 the demand curve has an elasticity of -0.92. Over the range $25 to $50 the arc elasticity is -0.87. Both of these elasticities are slightly less in absolute value than one. This implies that raising prices in this range will result in some increase in total revenue. Implications for use of these elasticities in determining the revenue maximizing level of license prices will be discussed in the following sections. The elasticity over the entire data range from $5 to $100 was -0.975 indicating that on average prices could be raised within this range with a slight increase in total revenue resulting.

Figure 4.7b shows the derived demand curve for nonresident license sales within the price interval of $5 to $200. The estimated price elasticities of demand for the non resident sample are perhaps of more interest than the resident elasticities from the perspective of increasing total revenues. Nonresidents are much more "inelastic" in their response to changes in license prices. Put another way, within a certain range of prices, increases in license prices do not result in large decreases in license sales within this group. The estimated price elasticity of demand for nonresident licenses over the price interval from $5 to $100 is -0.63. This indicates that increases in license prices within this range would lead to significant increases in total revenue.

Elasticity of demand can also be computed for continuous demand models where the relationship of quantity and price is given by a formula. The results described above suggest that the elasticities may be approximately constant over the range of $ 5 to $ 100 for residents. A constant elasticity of demand model is given by

$$Q = \alpha * P^{\beta}$$

Where:

$$\eta = \frac{dQ}{dP} * \frac{P}{Q} = \beta$$

This model was estimated for the demand relationship given in Figure 4.7 as:

$$\ln Q = \alpha + \beta \ln P$$

Table 4.6b shows the estimated models for residents and nonresidents. The elasticities on price are -0.875 for residents and -0.659 for nonresidents. The resident model has a very high coefficient of determination (R^2) of .983 indicating that nearly all of the variation in quantity is explained by the model. The nonresident model is less well estimated with an adjusted R^2 of .767, but still a large portion of the variability of the dependent variable is explained.

Table 4.6b also includes a constructed confidence interval around the coefficient (elasticity) on price. These 95% confidence intervals are based on the standard errors of the estimated price coefficients. The 95% confidence interval for the resident price elasticity of demand ranges from -0.79 to -0.96. This indicates that within the range of $5 to $100 price increases will result in somewhat increased total revenues. The nonresident elasticity confidence interval ranges from a very inelastic -0.41 to a slightly inelastic -0.91.

Table 4.6b. Estimated Continuous Demand Models for DSL Licenses, by Residency.

Variable / Statistic	Resident Sample	Nonresident Sample
Intercept	11.40 (81.46)	9.704 (21.96)
ln(Price)	-0.875 (-20.09)	-0.659 (-5.23)
Adjusted R^2	0.982	0.767
Lower 95 % C.I. on Elasticity Estimate	-0.79	-0.41
Higher 95% C.I. on Elasticity Estimate	-0.96	-0.91

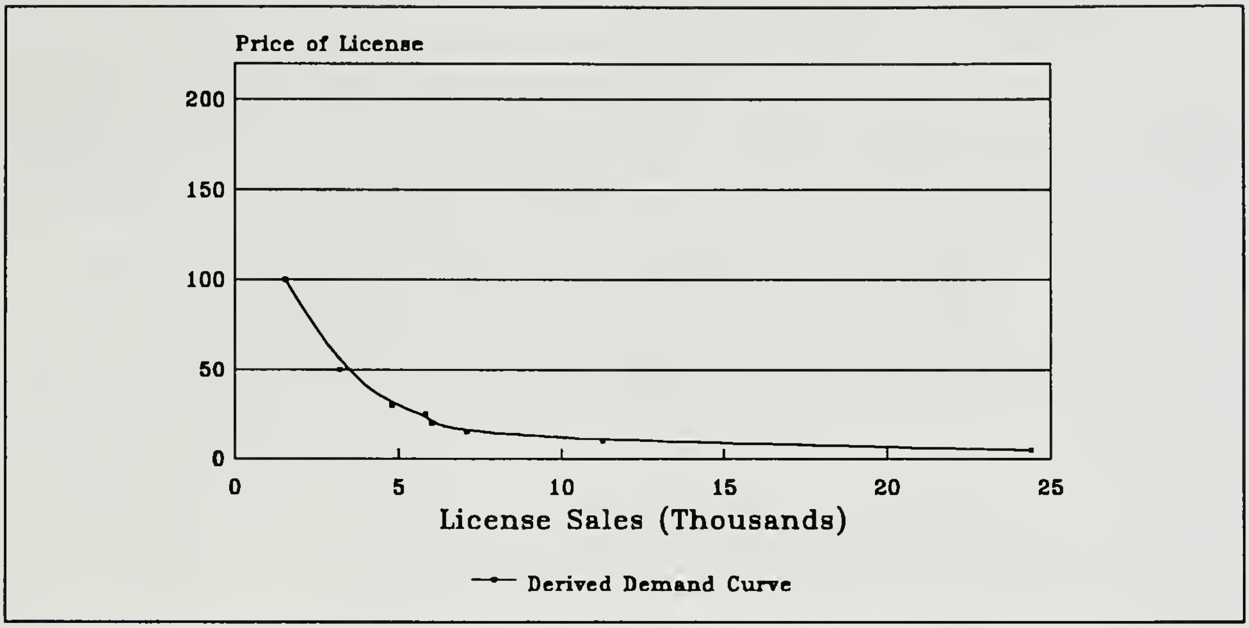


Figure 4.7a. Derived Demand Curve for Resident Montana State Lands License

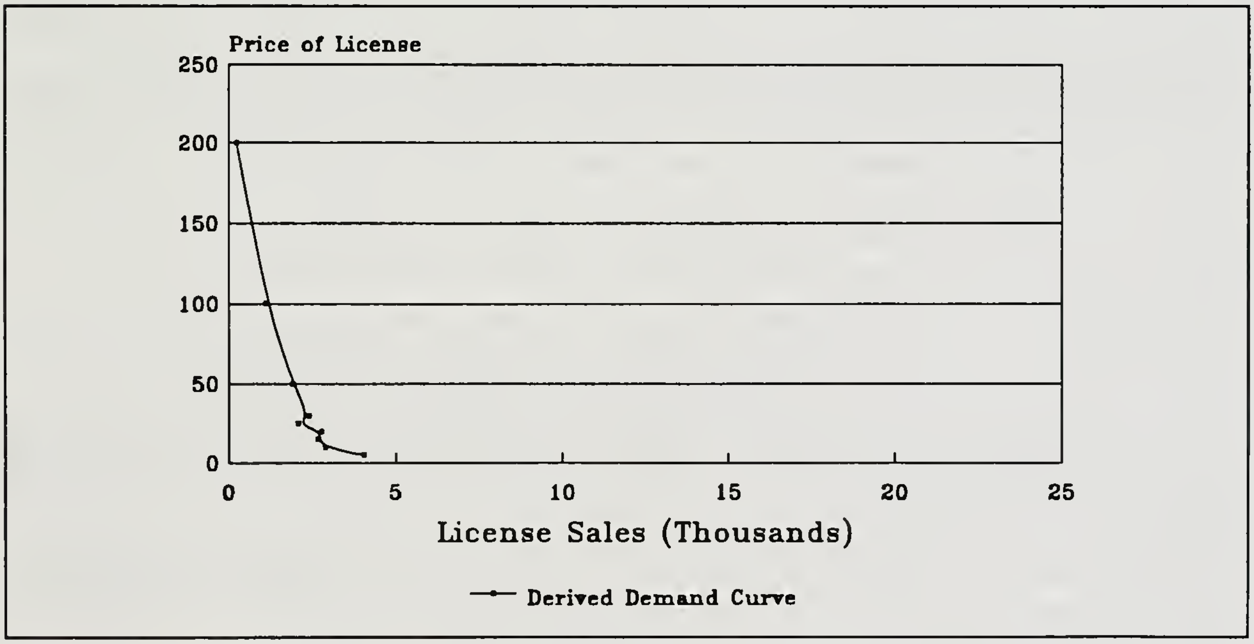


Figure 4.7b. Derived Demand Curve for Nonresident State Lands License.

4.2.7 Multivariate CVM Explanatory Model

One test of the validity of an estimated CVM model (such as the bivariate model presented above) is to introduce additional explanatory variables into the model. We would expect that certain variables, in addition to the bid level, could be used to help predict the probability of a "yes" response. Some variables which we might expect to have significant explanatory power are the respondents income, age, sex, state residency, and activity engaged in. Additionally, we might expect that a measure of the availability of comparable substitute areas to state lands for hunting and fishing would help explain a respondents willingness to pay for access to state lands. We examined a number of variables and found 5, in addition to the bid level, to have significant explanatory power: income, residency, gender, a dummy variable for whether the respondent felt there were many comparable substitutes to state lands in their area, and a dummy for hunters. A dummy variable is a variable which takes a value of 1 or 0. For example, in the case of the hunter variable, if the respondent was a hunter the variable would take the value of 1 otherwise it would take the value of zero. Table 4.7 shows the multivariate CVM model estimated for the pooled resident and nonresident sample.

All estimated coefficients are of the expected sign and all except the substitute variable (MANY) are significant at the 95% level of confidence or better (Table 4.7). The coefficient on ln(BID) is negative indicating that the higher the bid level the lower the probability the respondent will say "yes" to the bid. The coefficient on ln(INCOME) is positive, as expected, indicating that the higher a respondent's income the higher is the probability that they will respond with a "yes". The estimated coefficient on RESIDENT (a dummy variable where 1=Montana resident, and 0=nonresident) is negative and highly significant. This result is expected and indicates that nonresidents are more likely to respond "yes" to a high bid level than are Montana residents. The positive coefficient on SEX (a dummy variable with 1=male and 2=female) indicates that female respondents are more likely to respond yes to a given bid level than are men. The negative coefficient on MANY (a dummy variable with 1= respondent felt there were many comparable substitutes to state lands in his/her area) and 0= not many good substitute areas) is expected. This indicates that the more substitute areas there are to state lands, the less likely a respondent will respond yes to a given bid level. The final explanatory variable in the model is HUNTER. This variable is a dummy variable with 1=hunted on last trip to state lands, and 0= did not hunt. The coefficient on HUNTER is positive indicating that those respondents who hunted on their last trip to state lands were more likely to respond "yes" to a bid level than those individuals who did not hunt on state lands.

The significance of the explanatory variables in Table 4.7 and their consistency with our *a priori* expectations strengthen our conclusion that the responses predicted by the estimated models are not random but are consistently explained by the model.

Table 4.7. Estimated CVM Multivariate Logistic Regression Model of Willingness to Pay Increased License Costs: Pooled Resident and Nonresident Model.

Variable / Statistic	Coefficient
INTERCEPT (t-stat)	-0.892 (-0.77)
ln(BID)	-1.064 (-11.60)**
ln(INCOME)	0.364 (3.62)**
RESIDENT	-1.259 (-8.09)**
SEX	0.434 (2.46)**
MANY	-0.191 (1.43)
HUNTER	0.463 (4.03)**
Sample Size	1831

Note: ** denotes that the estimated coefficient is significant at the 95% level of confidence.

4.2.8 Point Revenue Predictions at Alternative License Price Levels

A primary goal of this task was to provide information and analyses which would help DSL identify the price level for the state lands recreational use license which would result in maximized revenue for the state. In this section we project total revenues from license sales at alternative price levels for residents and nonresidents. The methods are similar to Teasley and Bergstrom (1992).

One clear result of the CVM analysis presented previously is that residents and nonresidents have markedly different levels of willingness to pay for recreational use of Montana state lands. With this in mind, the analysis which follows will treat resident and nonresident license prices independently. A precedent for this kind of "price discrimination" is in the fee structure for resident versus nonresident hunters and anglers in Montana. In the 1992-93 season residents paid $54 for a combination big game fishing license while nonresidents paid $462 for a big game combination license. Additionally, resident anglers were charged $15 for a season license while nonresidents were charged $45 for the same license.

The actual responses which individuals gave to the CVM question were used to construct a revenue prediction table (Table 4.8). This table shows the alternative bid levels ($10-$200), the percentage of individuals saying they would buy the license at the different bid levels, the predicted revenue, and the predicted number of licenses sold. The predictions are based on the total number of licenses sold through December 31, 1992 (28,450), and the percentage of Montana residents from our license sample.

Table 4.8 shows that revenue would be maximized at a price level of $50 for the Montana resident recreational use license and $100 for the nonresident license. Although revenue would be maximized at this level, there would be a substantial drop in license sales with only 13% of residents willing to purchase a license at $50. Additionally, only 27% of nonresident 1992 license holders would purchase licenses at this price.

In general, nonresident license holders would provide a much larger increase in revenue from these increased fees then resident licensees. Table 4.8 shows the projected revenue from nonresidents increasing from $20,200 to $110,180. This represents a five-fold increase in total nonresident license revenue. Resident projected revenues, on the other hand, show a more modest 33% increase between the current $5 fee and the projected $50 fee. This relative stability of resident revenues is consistent with our estimated resident price elasticity of demand of -0.975 which predicts a modest growth in total revenue associated with an increase in price level. it appears that the relative inelasticity of demand for nonresident licenses (-0.63 over the price range $5 to $100) would provide relatively larger increases in total revenue from increased license fees from nonresidents compared to residents.

Table 4.8. Predicted License Sales and Revenue at Alternative Price Levels, by Residency.

Price Level	Proportion Buying License	# of Licenses Sold[1]	Predicted Revenue
Residents			
$5	1	24,410	122,051
$10	0.462	11,266	112,662
$15	0.291	7096	106,440
$20	0.246	6011	120,230
$25	0.239	5829	145,734
$30	0.197	4807	144,198
$50	0.131	3204	160,216
$100	0.063	1532	153,173
Nonresidents			
$5	1	4040	20,200
$10	0.714	2886	28,857
$15	0.660	2666	39,995
$20	0.686	2772	55,449
$25	0.512	2069	51,731
$30	0.592	2391	71,729
$50	0.474	1914	95,681
$100	0.273	1102	110,180
$200	0.059	238	47,525

---

[1] Estimates are based on 1992 license sales through Dec. 31 and a 85.8% resident proportion in sample.

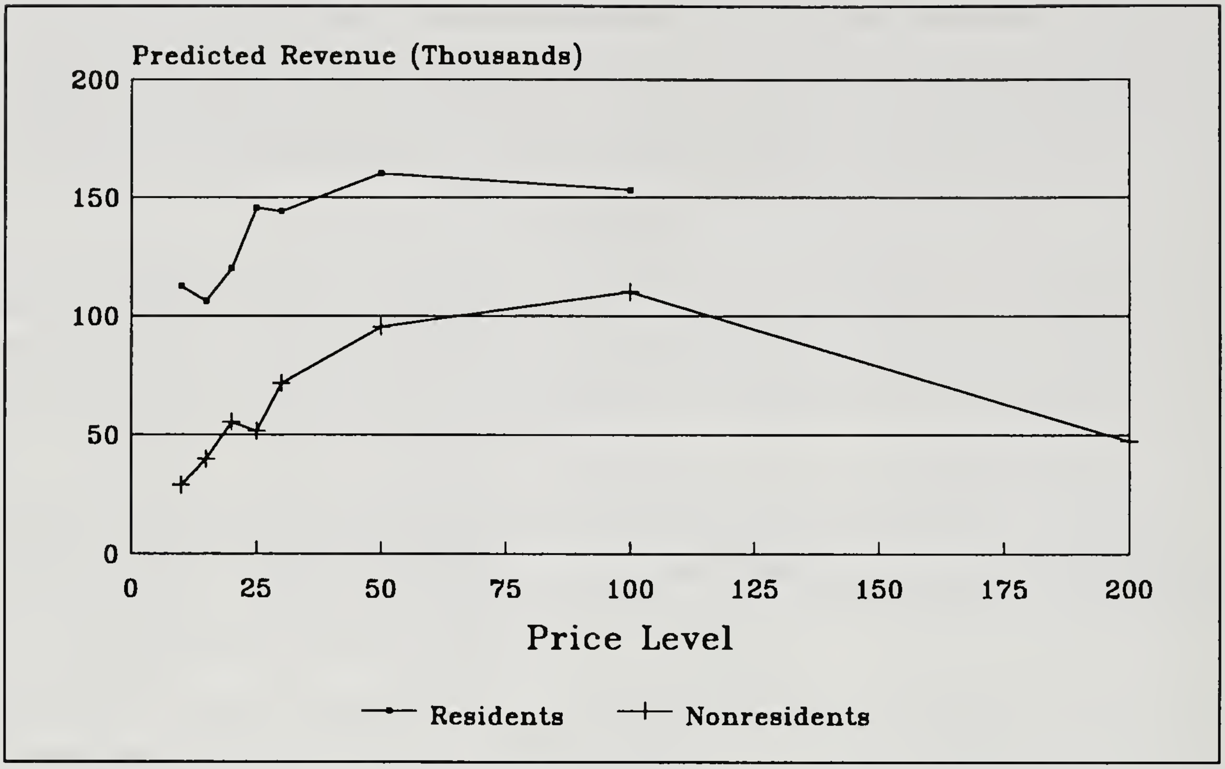


Figure 4.8. Plot of Predicted Revenue Point Estimates for Residents and Nonresidents.

4.2.9 Analysis of Precision of Revenue Projections

Table 4.8 presents predicted license sales and total revenue for alternative bid levels. It is important to understand that these estimates are point estimates and as such have confidence intervals associated with them. The confidence intervals are based upon the estimated standard errors for the observed proportion of "yes" responses to the bid levels. The equation for the standard error of a proportion is:

$$\sigma = \sqrt{\frac{P\ (1\ -\ P)}{n}}$$

One result of this standard error formula is that, given equal sample sizes, the standard error of a proportion becomes larger the smaller the proportion. This relationship has an important effect on the relative precision of the revenue estimates in Table 4.8.

Table 4.9 shows the revenue point estimates form Table 4.8 along with the upper and lower 95% confidence intervals around those estimates. The standard error for the $5 levels is equal to zero as this is an actual rather than predicted proportion.

Figure 4.10 shows a plot of the overlap between the confidence intervals for the resident revenue projections. Figure 4.9 shows the same plot for the nonresident sample.

Table 4.9 and Figures 4.9 and 4.10 clearly show that as the bid level increase and the proportion of respondents answering yes decreases the confidence interval surrounding the point estimates widens. In short, we can be less confident in our revenue projections from higher bid levels than those from lower bid levels.

With overlapping confidence intervals, such as those shown in the following figures, the task of selecting a profit maximizing price level becomes more difficult than was presented in the simple case of the point estimates presented in Table 4.8.

One approach to maximizing total revenue would be to select our best estimate of profit maximizing price levels from Table 4.8. This would suggest choosing a $50 price for residents and a $100 price for nonresidents. This approach ignores, however, the relative precision of the alternative revenue estimates.

A more conservative approach to profit maximizing might be to select the resident and nonresident price levels which have the highest value for their lower confidence limit. Using this criterion the resident license price would be set at $ 25 and the nonresident price would be set at $50 (since the lower 95% confidence limit for this price level of $68,780 is higher than for any other price level). This strategy would minimize the chance (at the 95% level of confidence) that the chosen price levels would result in a lower total revenue than any alternative price level. This strategy while limiting the risk of receiving lower than expected total revenue, might also result in limiting the maximum revenue (it must be remembered that confidence intervals extend both below and above point estimates).

Table 4.9. Estimated Revenue Predictions and 95% Confidence Intervals for Alternative Bid Levels, by Residency.

Bid Level	Estimated Revenue	Lower 95% C.I.	Upper 95% C.I.
Residents			
$10	112,662	98,869	126,456
$15	106,440	86,152	126,728
$20	120,230	95,047	145,412
$25	145,734	114,583	176,885
$30	144,198	108,732	179,664
$50	160,216	110,019	210,412
$100	153,173	80,514	225,832
Nonresidents			
$10	28,857	24,581	33,132
$15	39,995	32,849	47,141
$20	55,449	46,041	64,858
$25	51,731	37,875	65,586
$30	71,729	55,986	87,472
$50	95,681	68,780	122,582
$100	110,180	46,843	173,518
$200	47,525	-42,846	137,897

One perspective is that DSL should perhaps view the pricing of recreation licenses as an iterative process. There is substantial evidence that the $5 fee is too low. Increased revenue would likely result from setting the next iteration at a price of $25 for residents and $50 for nonresidents.

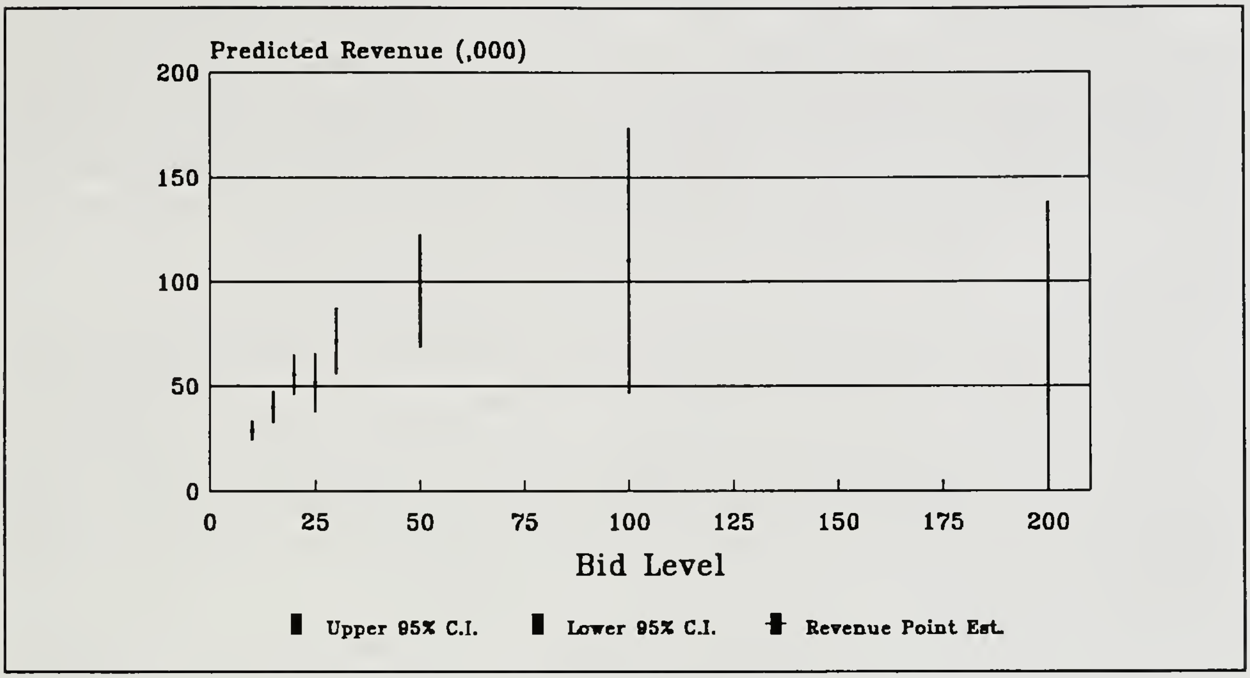


Figure 4.9. Estimated 95% Confidence Intervals for Revenue Point Estimates: Nonresident Sample.

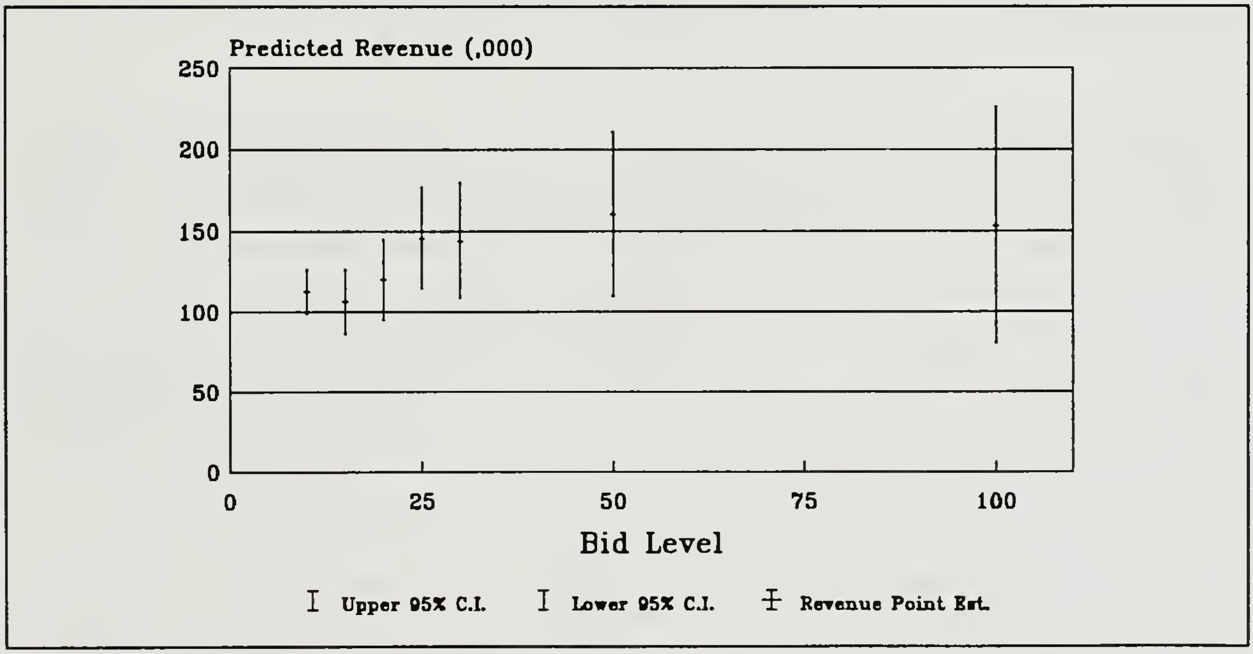


Figure 4.10. Plot of 95% Confidence Intervals Surrounding Revenue Point Estimates: Resident Sample.

4.2.10 Individual Observation Travel Cost Model

In addition to the contingent valuation model, a second model of demand and willingness to pay for state land recreation was estimated. This model, an individual observation travel cost model (TCM), used respondent's reported information on numbers of trips to state lands and the distances traveled to those lands to estimate a model, and calculate willingness to pay. This model was estimated for Montana residents only. There was not sufficient variation in the number of trips taken by nonresidents to derive a travel cost model for this group.

As noted previously, where individuals visit only one site the values associated with all trips taken to the sites provide an approximation for the value of the DSL permit which makes these trips possible. Accordingly, the TCM model is conservative in that it is estimated only for trips to the most recently visited site. About 86% of the respondents to the DSL license holder survey reported visiting either 1 or 0 sites in 1992. Developing a model that incorporated multi-site use of the resource would be more complex and would indicate higher overall permit values than are reported for the current model.

Because the travel cost model estimates the demand for trips (not licenses) it is not possible to derive the elasticity of demand for licenses from this model. Accordingly, our discussion of this model focuses on an estimate of average willingness to pay for trips taken to a given site. This value provides a conservative approximation to the permit value and is compared to the CVM model value estimates.

In the case of the TCM model, four covariates, in addition to TRAVEL COST were found to be significant in explaining the number of trips taken to a specific piece of state land. These variables were the respondent's INCOME, a substitute variable, their AGE, and their SEX.

An analysis of the estimated coefficients reported in Table 4.10 shows that the coefficient on TRAVEL COST is highly significant and has a negative sign indicating that as travel costs increase fewer trips are taken to a site. In addition to TRAVEL COST, the coefficient on AGE is positive and significant at the 90% level of confidence. This indicates that on average older respondents make more trips to individual state land sites than do younger respondents. The variable FEW is a measure of the availability of substitute areas for given activities. FEW is a dummy variable taking the value of 1 if a respondent said that there were few places in their area which were as good or better than the state lands which they visited for the activity which they pursued there. Thus, a respondent scored a 1 for FEW if they felt there were few good alternative areas to state lands for them to hunt or fish on. If the respondent did not feel this way they scored a 0 for the FEW dummy variable. As would be expected, the sign on the FEW coefficient is positive. This indicates that the fewer the number of substitute sites to state lands the greater the number of trips taken to state lands. The coefficient on SEX is negative and significant indicating that men on average take more trips to state lands than do women. Finally, the coefficient on INCOME is negative and highly significant. This indicates that the higher a respondents income, on average, the less trips they make to state lands. While this may seem counterintuitive on the surface, it does not run entirely counter to our expectations. Along with a high income often also comes a constraint on leisure time. Alternatively, a low income (retired or unemployed, for example) may be accompanied by much free time. This time constraint effect may lead higher income individuals to take fewer trips. Additionally, many residents spent very little (less than $5/trip) to make many trips to a nearby section of state land. In these instances, free time would be more of a constraint on number of trips than would income.

All of the explanatory variables in the multivariate TCM model are of the expected sign and are significant at least the 95% level of confidence. As with the CVM model discussed above, this significance and consistency with *a priori* expectations supports the conclusion that the model is consistent with rational economic choices.

One assumption was made in the construction of this straightforward model which bears some discussion. While data was readily available on the number trips taken and the distance to the state land parcels visited for those respondents in our sample who took trips, this information was missing for those who did not take trips. These "zero trips" individuals were therefore assigned an average distance which they would have traveled had they taken a trip. This average distance was the mean distance traveled to state land parcels by respondents living in the same county as the "zero trips" individual. Construction of this proxy distance allowed the use of many additional observations in the regression analysis, as well as providing information on individuals who took no trips. The inclusion of the nonparticipants into the model is recommended in the economics literature as providing more appropriate models of recreation behavior (Hellerstein 1992 and Creel and Loomis 1990).

4.2.11 Travel Cost Model Estimates

The TCM model, once estimated, was used to calculate average net willingness to pay for the sample. A key choice in estimating willingness to pay lies in the choice of an upper limit to use in the integration of the estimated function. For the estimate shown in Table 4.11 the upper limit of integration used was the cost corresponding to the furthest observed travel distance ($440).

As noted above, the net willingness to pay estimate in Table 4.11 represents a conservative estimate of the fair market value of a DSL recreational use license because it is based on the average value of trips taken to one site only.

Table 4.10 Estimated Resident Multivariate Individual Observation Travel Cost Model.

Variable / Statistic	Coefficient (t-stat)[1]
INTERCEPT	2.065 (24.44)**
TRAVEL COST	-0.028 (-26.07)**
INCOME	-7.370e-06 (-6.77)**
FEW	0.461 (10.58)**
AGE	-0.0059 (-4.13)**
SEX	-0.300 (-5.41)**
Sample Size	1509

Note: t-stat marked with ** indicates that the coefficient is significant at the 95% level of confidence. Note also the estimated model is a poisson model and thus the test of significance for the t-stat is a one-tailed test.

Estimated net willingness to pay values were derived from the estimated model through direct integration of the estimated demand function. Using an upper limit of integration of the maximum observed travel cost (travel cost in this case is defined as round trip distance * .22/mile) to a site, an average willingness to pay value of $62.92 was derived (Table 4.11).

Table 4.11. Mean Net Willingness To Pay Estimate for Montana Residents.

Statistic	Montana Residents
Mean Net Willingness to Pay	$ 62.92
Sample size	1509

4.2.12 Derived Demand for Hunting and Fishing Trips to State Lands: Individual Observation Travel Cost Model

As was done with the CVM model above, it is possible to construct a derived demand curve for trips taken by individuals to Montana state lands at alternative levels of travel cost. For computational ease, this demand curve was constructed for the bivariate specification of the travel cost model: number of trips being a function of only travel cost. This bivariate specification yields willingness to pay estimates and trip predictions which are very close to those predicted by the multivariate specification.

Figure 4.11 shows the derived demand curve for trips per individual to state lands at alternative travel cost levels from $ 5 to $ 100. As was done for the CVM demand model, arc elasticities were calculated for travel cost intervals within this interval. For the range from $ 5 to $ 25 the arc elasticity is -0.46. This statistic indicates that within this range the number of trips taken is relatively unresponsive to changes in travel costs. The elasticity for the $ 25 to $ 100 range is -1.13. Within this travel cost range the quantity of trips response to changes in cost is much more elastic. This indicates that as travel costs rise in this range, on average the total expenditure on travel declines. A final elasticity was computed for the range of travel costs from $ 5 to $ 100. The estimated elasticity within this range was -1.00.

It should be noted that the estimated elasticities for the CVM model and for the TCM model are not directly comparable as the CVM model estimates demand for licenses and the TCM model estimates demand for trips. The appropriate comparison between the TCM and the CVM models is between the net willingness to pay estimates derived from these two models. This comparison is discussed below.

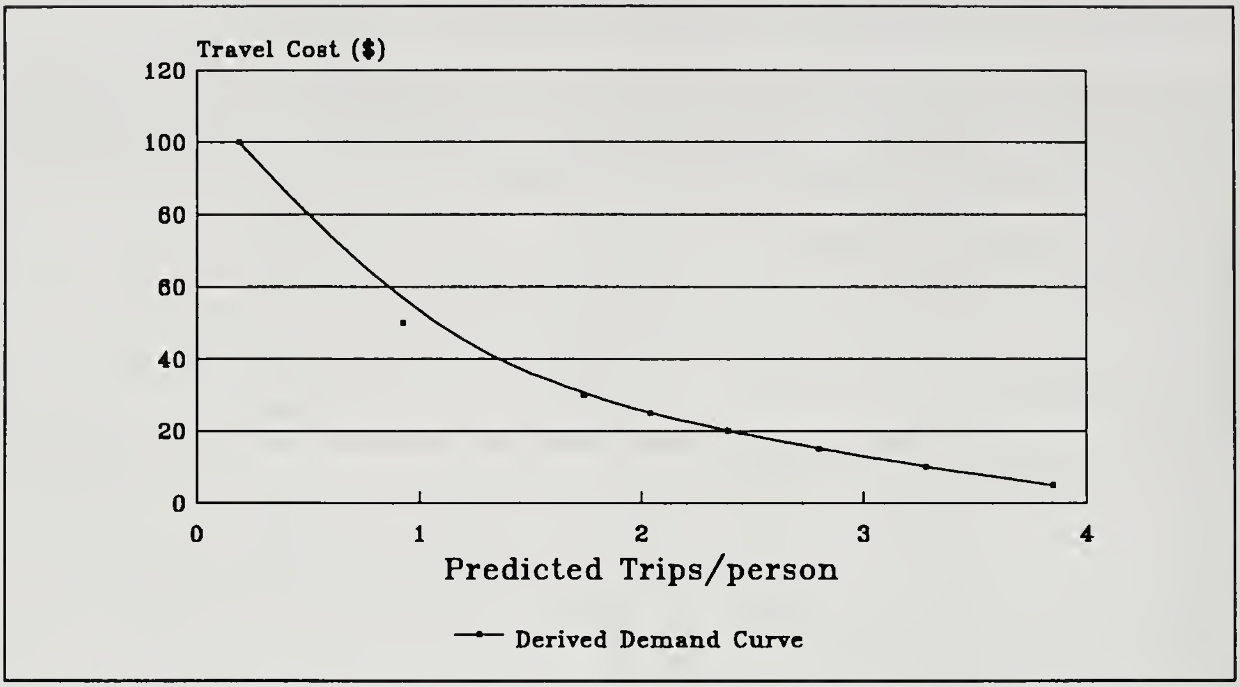


Figure 4.11. Derived Demand Curve for Trips to State Lands per Individual: Resident Sample.

4.2.13 Discussion and Comparison of CVM and TCM Estimates

The contingent valuation model and the travel cost model are two very different techniques for estimation of net willingness to pay and the price/quantity demand relationships. The TCM uses observed data (actual reported trips taken to a site) in order to derive it's estimates. The CVM, on the other hand, uses statements of behavioral intent in it's estimation. While both of these methods measure the same thing (the net economic value associated with a DSL recreation license, in this case) they use widely differing methods to do so.

A comparison of the value estimates from the two models (Table 4.12) shows that the TCM estimates are roughly two times the CVM estimates. In order to make a valid comparison of the models equal truncation points were used for the valuation integration procedure. Table 4.12 shows the models' value estimates at three alternative truncation levels: $50, $100, and $200.

In general, we consider both the CVM and the TCM estimates to be conservative. The TCM estimates are conservative in that one assumption of the model is that respondents made trips to only one state land site last year. The inclusion of trips to more than one site for the year would have resulted in higher net willingness to pay estimates. The CVM estimates are conservative because we have not excluded possible "protest" responses where individuals respond "no" as a protest to the idea of paying for recreation or higher recreation fees. Some individuals may also be behaving "strategically" expecting that their response will influence public pricing policy. We also expect that a permit fee will tend to understate true values based on the analysis and experience of other researchers. Mitchell and Carson (1988) provide a discussion of this literature and note that responses may be dominated by the existing fee structure rather than the true value of the permit. For all of these reasons we expect CVM to be low. This is supported by comparison to the TCM, which itself is conservative.

The estimates from the CVM models are conservative in two respects. First, they are conservative due to the treatment of protest responses in the data set. Individuals who responded "no" to the bid question and indicated that they were "protesting" the Bid scenario and that the increased license price would be a "rip-off" were left in the data set rather than excluded. It is an accepted statistical practice to exclude such responses from the analysis since it is unknown whether the individual truly would not pay the bid amount or whether they are simply refusing to accept the questioning format. The result of leaving these responses in the data was to increase the percentage of valid "no" responses and thus reduce the estimated willingness to pay values.

In addition to the handling of protest responses, the CVM estimates are conservative in comparison to the TCM estimates in another way. The TCM estimates are based on actual distances traveled and costs incurred. Since the dependent variable was number of trips, an increase in the number of trips necessitated an increase in travel costs. The CVM estimates, on the other hand, predict the percentage of individuals purchasing a license at alternative price levels. Therefore, unlike the TCM, the CVM allows for the possibility of uncompensated use of state lands. Indeed, many comments from respondents indicated that they felt that given the probability of being fined (low) they would not purchase the license at an increased price and use state lands anyway. Due to this possibility of unlicensed use, CVM estimates will be conservative compared to TCM estimates which are based on actual observed trips.

Table 4.12. Comparison of Mean Net Willingness to Pay Estimates for CVM and TCM Models at Alternative Truncation Levels.

Truncation Level	Resident Estimates		Nonresident Estimates
	Travel Cost Model	CVM Model	CVM Model
$ 50	30.79	15.14	30.66
$ 100	54.59	19.46	47.53
$ 200	62.44	23.83	68.92

4.3 Comparison of State Lands Recreation Survey Results to Parallel Recreational Use Markets

4.3.1 Comparison to Flathead Reservation Use and Conservation Permits

The mean net willingness to pay estimates for state land use licenses shown above are substantially higher than the current $5 price, yet prices in these ranges are not without precedent in Montana. The Flathead Indian Reservation is located in northwestern Montana and comprises 1.24 million acres of land including the southern half of Flathead Lake. For many years the Confederated Salish and Kootenai Tribes, who manage the resources on the reservation, have sold recreational use, fishing, and bird hunting permits to nonmembers of the tribe. In 1992 the price for a Flathead Reservation use and conservation permit, fishing permit and bird hunting permit was $30 total. Of this amount, $6 was for the conservation permit, $12 for fishing and $12 for bird hunting. In 1992, through December 31, the tribe had sold 14,186 conservation licenses, 8215 fishing licenses and 2089 bird hunting licenses. These sales show that a large number of individuals are willing to pay prices well in excess of $5 for fishing and hunting access to specific lands which would otherwise be closed to them.

Table 4.13 shows a comparison of land and activity attributes for the Flathead Reservation License and the State Lands recreational use license. One point which should be made is that big game hunting is not allowed on reservation lands while it is the primary use of state lands. This is significant because big game hunting in Montana is generally a higher valued recreational experience than either fishing or bird hunting (Duffield 1988, Duffield, Loomis, and Brooks 1987). This indicates that were big game hunting allowed on the Flathead Reservation, sales of permits would probably be higher and higher permit prices would also probably be justified. The basic point of this comparison is that the tribe sells permits which do not allow big game hunting (but do allow general recreational use) and are for access to only one fifth as many acres, yet are priced six times as high as the DSL permit.

Table 4.13. Comparison of Prices, Activities, and Resources for DSL License and Flathead Reservation Recreational Use License.

Attribute	State Lands License	Flathead Reservation Use and Conservation Permits
Price by Activity		
Recreation	--	$6.00
Fishing	--	$12.00
Hunting	--	$12.00
Subtotal	$5.00	$30.00
Acreage Available	5,200,000	1,240,000
Big Game Hunting Available	Yes	No
Activities Besides Hunting and Fishing	None	Camping Hiking
Season	DFWP	DFWP
Permits Sold (1992)		
Recreation	--	14,186
Fishing	--	8215
Hunting	--	2089
Combined Fish and Hunt	28,450	--
DFWP License Required?	Yes	No

4.3.2 Comparison of Calculated Elasticities to a Model of U.S. Deer Tag Sales

As was discussed previously, the contingent valuation analysis yielded a derived price elasticity of demand estimate in the range of -1.00. Recall that price elasticity is one measure of the shape of the demand curve (Figure 1.1). In an attempt to determine if other analyses of demand for recreational experiences showed similar elasticities, a model of the demand for deer tags in the western United States was estimated. Demand for deer tags was estimated since deer hunting was listed by respondents as a primary activity on the state lands. This approach parallels work on the demand for hunting and fishing licenses by Duffield (1988), and work in progress by Stavins (1992). Stavins is constructing a multi-state model of demand for fishing licenses in the United States by using 20 years of data on license sales. Duffield estimated the value of nonresident Montana combination licenses based on the responses to price changes. prices for the permits in creased from $151 in 1975 to $450 in 1988. in 1970-78 the nonresident quota (17,000) was nonbinding and market quantity demanded could be observed.

For the analysis of deer hunting, data was collected from all states west of the Mississippi (and including Wisconsin) on deer hunting tag sales from 1970-1991. This data was analyzed as a cross-sectional time series (all states and all years were combined). Only resident tag prices and sales were analyzed. Further, only states which issued a separate deer hunting tag were used in the data base. These restrictions were placed on the model to ensure a greater degree of comparability between the states. Finally, the time series prices were indexed to a 1982-84 base price level.

Table 4.14 shows a comparison of 1991 big game hunting fees in Montana and other western states. This table shows that while Montana big game hunting licenses are among the lowest in price for residents, for nonresidents they are among the highest in price. It should be noted that the Montana nonresident deer/elk combo license is limited in number to 17,000 licenses per year. This limit for this license (which cost $450 in 1991) has been reached each year since 1979. Comparison across states is somewhat difficult because license structures vary widely between states. It does seem clear, however, that the quality of big game hunting in Montana compared to other western states is at least above average if the willingness of nonresidents to purchase relatively high priced big game licenses is used as a measure of that quality.

Table 4.14 Comparison of Big Game Hunting Fees in Montana and Other Western States.

(A) States Excluding Montana

License	Min	Max	Mean	Std Dev	n
Resident					
Hunting	5.00	22.00	12.53	6.48	9
Hunting/Deer	10.00	42.50	18.48	11.33	7
Deer	10.00	30.50	18.31	5.31	11
Elk	16.00	75.50	39.15	23.03	10
Antelope	15.00	53.00	27.11	12.45	9
Non Resident					
Hunting	2.00	150.00	68.28	45.34	9
Hunting/Deer	100.00	200.00	120.27	39.51	6
Deer	16.25	150.00	101.88	42.28	10
Elk	100.00	303.00	211.50	74.97	7
Antelope	91.00	253.00	152.00	70.67	7

(B) Montana Fees

License Type	Montana Resident Fees	Nonresident Fees
Deer/Elk Combo:	--	$450.00
Deer Combo:	--	$200.00
Deer A:	$9.00	$150.00
Deer B:	$7.00	$50.00
Antelope:	$6.00	$120.00
Conservation:	$2.00	$2.00
Resident Deer/Elk/Bear/Fishing	$54.00	--

Table 4.15 shows the estimated relationship between deer tag sales and tag price. The estimated model was a log-log specification with deer tag sales being a function of tag prices. The coefficient on price is negative, as expected, indicating that at higher price levels fewer tags were sold. This coefficient is also highly significant at greater than the 99% level of confidence. The adjusted R^2 of .618 shows that a large portion of the variability in the sales of tags is explained by the model. The derived demand curve from this model is shown in Figure 4.12.

It is significant to note that the price elasticity of demand for the above model is -1.027. This is quite comparable to the overall arc elasticity for the CVM responses of -0.975. The similarity of these three estimates supports the validity of the CVM model of the demand for the state lands recreational use license.

Table 4.15. Estimated Cross-Sectional Time-Series Model of Demand for Resident Deer Hunting Tags in the Western United States.

Variable / Statistic	Coefficient (t-stat)
INTERCEPT	14.052 (86.78)
ln(PRICE)	-1.027 (-15.62)
Adjusted R^2	0.618
Sample Size	151

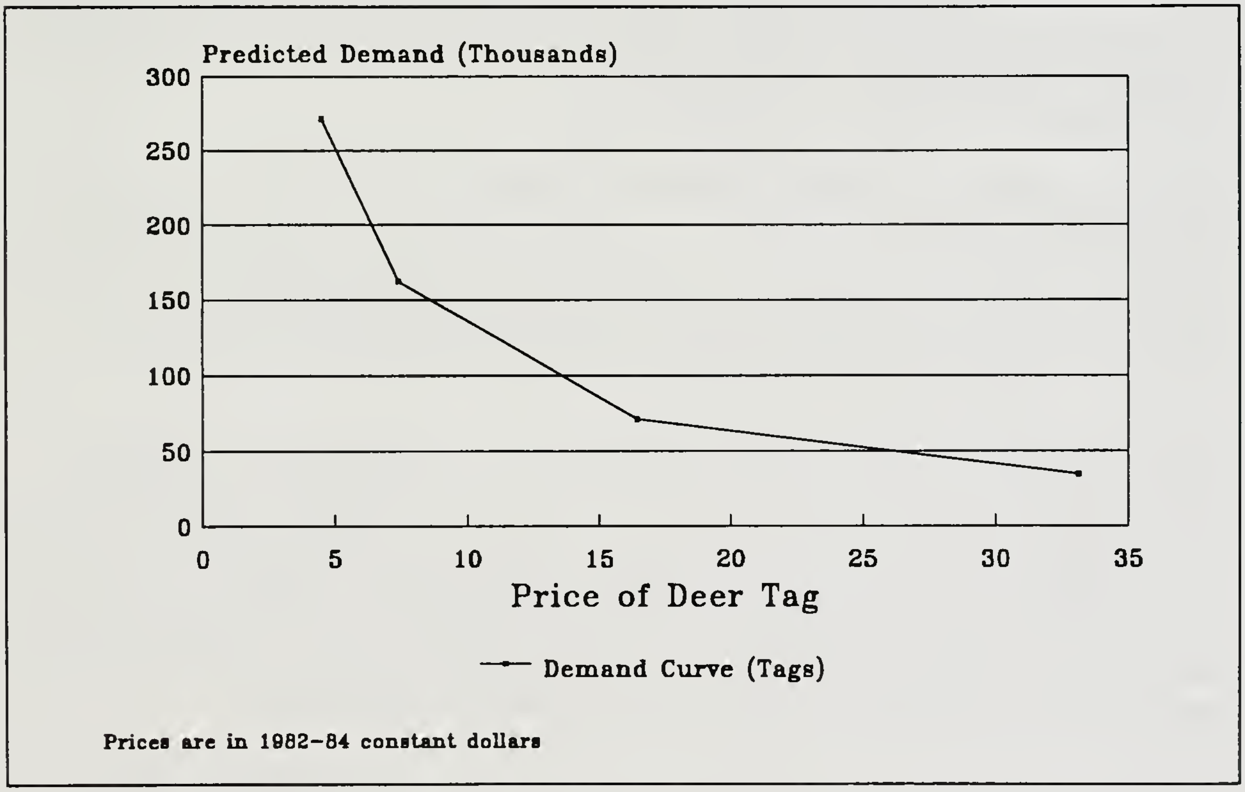


Figure 4.12. Plot of Cross-Sectional Time Series Demand for Deer Tags: Western U.S.

4.3.3 Comparisons of Net Willingness to Pay Estimates to Montana CVM and TCM Studies and Fee Fishing and Hunting in Montana

The willingness to pay estimates cited in the preceding section while substantially higher than the 1992 license fee of $5, are quite conservative in relation to existing fishing and hunting willingness to pay estimates from the U.S. as a whole and from Montana in particular. Walsh, Johnson, and McKean (1988) report an average net willingness to pay for hunting for 83 independent CVM and TCM studies conducted between 1968 and 1988 to be $41.69 per day (Appendix C). The average willingness to pay from 39 cold water fishing studies was $30.62 per day. Note that these estimates are in 1987 dollars and thus the same estimates in current dollars would be larger. Montana estimates of net willingness to pay for fishing and hunting have tended to be somewhat larger than the U.S. estimates (Brooks (1988) reported a TCM estimated net economic value (NEV) per day for Montana deer hunting of $55. Duffield (1988) reported a NEV of elk hunting in Montana of $66 per day. Duffield, Loomis and Brooks (1988) found an estimated per day NEV for Montana stream fishing of $98.82). This may be due to the high quality of fishing and hunting opportunities available within the state. It should be noted that the Walsh et al. value estimates are per day estimates. Resident respondents to this survey reported taking an average of 2.1 trips each lasting an average of 2.54 days. Nonresidents took an average of 0.98 trips each averaging 9.08 days. Using the Walsh, Johnson and McKean (1988) average values per day and the number of recreational days reported by DSL license holders indicates a value of $150 to $200 for residents and $270 to $360 for nonresidents.

In addition to TCM and CVM estimates of willingness to pay for hunting and fishing in Montana, there are several examples of fee fishing within the state. Examples from the Beaverhead and Ruby Rivers and from Nelson's Spring Creek show common private fishing or "rod fees" charged by landowners in Montana to be in the $25 to $40 per day range. While these private fee fisheries provide high quality fishing experiences, there is no shortage of comparable public fishing in the areas surrounding these "fee fisheries".

In addition to the fee fishing examples cited above, It is relatively common in parts of Montana for landowners to charge for hunting access to their lands. The population of hunting outfitters in Montana were surveyed in August and September of 1992 as to the fees which they paid landowners for hunting access. From this survey information 11 examples of per hunter charges by landowners were reported. One charge of $1000 per hunter was excluded from analysis of these responses as being outside the general range of the other responses. The remaining 10 cases showed a range of $10 to $100 per hunter being charged for access for a hunting trip. The mean charge from this sample was $49.

Both the current literature on willingness to pay for fishing and hunting experiences in Montana and the U.S. and existing examples of fee fisheries and hunting areas in Montana suggest that the willingness to pay estimates for the state lands permit derived from the TCM and CVM models represent conservative estimates of true willingness to pay for access to these lands.

5.0 INTERPRETATION

This task had as its primary goal to estimate the price responsiveness of demand for the Montana state lands recreational use license. Two independent estimation models and two supporting comparisons from parallel recreation markets were used to estimate this responsiveness. The estimated models and market comparisons support the view that increased license prices could significantly increase total revenue to the state.

Key to this recommendation is the finding that nonresidents are much less sensitive to increased license prices than are residents. This supports price discrimination with relatively higher prices for nonresidents.

Montana residents have an estimated price elasticity of demand for DSL licenses of slightly less than 1 (in absolute value). This indicates that increasing license fees to this group will result in only moderately increased revenue levels.

The evidence is very clear that the current price of $5 is too low. Prices of $25 for residents and $50 for nonresidents will likely result in increased total revenue to the school trust. These prices are not unreasonable by comparison with license fees on the Flathead reservation or by comparison with fee fishing and hunting fees in Montana.

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APPENDIX A: Survey Instruments.

Montana DSL Recreational License Sample - December 92. ID # A-________

A. Introduction

1. Read Intro Paragraph. 1. YES (will respond) 2. NO (refusal)

2. Did you make any hunting or fishing trips specifically to use a tract of Montana state lands so far in 1992? 1. YES (SKIP TO # 5) 2. NO 3. DON'T KNOW (SKIP TO #19)

3. (IF NO) Did you have any thoughts or even tentative plans about making a trip to a specific tract of state lands this year, even though you did not make such a trip? 1. YES 2. NO

4. How would you rate the availability of other places you could have gone in the area where you live that were just as good as the state lands section you considered visiting?
1. FEW PLACES 2. SOME PLACES 3. MANY PLACES
(SKIP TO QUESTION #19)

B. Most Recent Trip Information

5. How many such trips did you take in total so far in 1992 to hunt or fish on state lands?
________ NUMBER OF TRIPS FROM HOME

6. Now I'd like to ask you a couple questions about your most recent trip to hunt or fish on a tract of Montana state school trust lands:

7. What was the primary purpose of this most recent trip? 1. hunt birds 2. hunt antelope
3. hunt deer 4. hunt other species: ________ 5. fishing 6. other: ___________
7. hunt elk (IF 5 OR 6, SKIP TO #9)

8. Are there many other places in the area where you live for (ANSWER TO 7) that are just as good as the state lands section you visited? Would you say there are:
1. FEW PLACES 2. SOME PLACES 3. MANY PLACES

8a. (If hunting) On this most recent trip did you bag any birds or animals? 1. YES 2. NO

8b. (If yes) What did you shoot? (circle all that apply) 1. antelope 2. deer 3. elk
4. upland birds 5. waterfowl

8c. (If big game hunting) Did you pass up an opportunity to harvest a legal big game animal ? 1. YES 2. NO

8d. (If yes) How many opportunities did you pass up? ________ NUMBER

9. Where is the tract of state lands located that you most recently visited? NEAREST TOWN OR LANDMARK _______________ COUNTY ________________

10. Do you know approximately how large this tract of state land was? 1. one section (one square mile) 2. more than one section. (If 2.) NUMBER OF SECTIONS ______.

11. How many days were you away from home on this trip? _________DAYS

12. How many miles is it one-way from your home to this tract of state land?
MILES ONE-WAY FROM HOME ______________

13. How long does it take you to travel one-way from your home to this tract of state land?
________HOURS __________MINUTES

14. Did you visit this tract of state land more than once this year? 1. YES 2. NO (IF YES) How many times total did you visit it this year? _______. Were all of these visits for the same purpose? 1. YES 2. NO

14a. (IF NO) How many of these trips were for _____bird hunting ____antelope hunting _____ deer hunting _____elk hunting _____ other hunting _____ fishing _____ other

15. How much did you spend on this most recent trip to hunt or fish on this tract of state land? Please include gasoline, food, other travel expenses, lodging, equipment bought specifically for this trip, and any guide fees.
_________TOTAL DOLLARS (gasoline, other travel expenses, lodging, food, equipment)

16. Is this tract of state land which you most recently visited used primarily for: 1. GRAZING 2. CROPLAND 3. FOREST 4. OTHER ________________ 5. DON'T KNOW

16a. (IF GRAZING OR CROPLAND) Were you personally acquainted with the grazing or cropland leaseholder on this tract prior to choosing to recreate there in 1992? 1. YES 2. NO

C. Other Trips

17. Did you visit any other tract of state lands this year for hunting or fishing besides the one we have been discussing? 1. YES 2. NO (IF YES, REPEAT QUESTIONS 7,9,10, 11, 12 and 14 AND FILL IN THE FOLLOWING MATRIX FOR THE SECOND MOST RECENTLY VISITED SITE) NOTE: Repeat for up to FIVE TOTAL SITES.

	SITE 2	SITE 3	SITE 4	SITE 5
Primary Purpose				
Nearest Town/Landmark				
County				
Size: # Sections				
Trip length in Days				
Miles one-way				
# of Visits this site / this year				

18. Did you use an outfitter on any of your past trips to use state lands? 1. YES 2. NO

19. Did you make any trips for hunting to lands other than state lands in 1992 such as National Forest or privately owned lands? 1.YES 2. NO

19a. (IF YES) How many of these trips were for _____bird hunting ____antelope hunting _____ deer hunting ______elk hunting _____ other hunting

20. Considering the use that you will usually make of your State Lands Recreational Use License, would you choose to buy this license even if it cost _______? 1. YES 2. NO

20a. (IF NO) Do you have any comment on why you would not purchase the license?
1. Too expensive 2. I wouldn't use it enough to be worth it
3. I would use other lands instead 4. The fee would be a "rip-off"
5. Other: ____

D. About the Respondent

21. Now I'd like to ask you just a couple questions about yourself: PLACE OF RESIDENCE:
______________________ CITY/TOWN ___________ STATE ____________ ZIP

22. What is your AGE ___________

23. Are you: 1. MALE 2. FEMALE

24. Are you a member of any hunting, fishing or conservation organizations? 1. YES 2. NO

25. Highest year of formal EDUCATION completed? : 1. some high school 2. completed high school 3. some college 4. completed college 5. postgraduate study or degree

26. I am going to read a list of income categories. Please stop me when I come to the category that best describes the total amount of income received by all of the members of your household in 1991. You can just tell me which letter applies. The categories are.....

1. A. Under $5000
2. B. $5000 to $10,000
3. C. $10,000 to $15,000
4. D. $15,000 to $20,000
5. E. $20,000 to $25,000
6. F. $25,000 to $30,000
7. G. $30,000 to $35,000
8. H. $35,000 to $40,000
9. I. $40,000 to $50.000
10. J. $50,000 to $75,000
11. K. $75,000 to $100,000
12. L. over $100,000

That's my last question. Thanks for your help!

SURVEY B. - RECREATIONAL USE OF STATE LANDS - Montana DFWP Conservation License Holder Sample - Nov/Dec 92. Survey # B - _____ ID NUMBER.

1. Hello, my name is __________. I'm conducting a survey for Montana Department of State Lands. Could I speak with (name of license holder)?

2A. If individual named is not available: "When should I call back to speak with (name of license holder) ?" CALL BACK TIME, DATE __________.

2B. If individual is available, repeat #1 as necessary, then continue: Your name was randomly drawn from a list of people who have purchased a Montana Department of Fish, Wildlife and Parks's conservation license. Could I take a few minutes of your time to find out what recreational use you have made or plan to make of Montana state lands? Your responses will be totally confidential and will never be associated with your name.
___ YES ___ NO. IF NO, is there another time I could call you back? TIME/DATE ________. If still NO, record _____ REFUSAL (terminate interview).

3. Are you aware that recreationists can now access lands administered by the Montana Department of State Lands for hunting or fishing if you purchase a Montana State Lands Recreation License? ___ YES ___ NO COMMENT:

4. Did you purchase one of these Montana State Lands Recreation Licenses in 1992?
__ YES (IF YES GO TO #5) __ NO (IF NO SKIP TO #6)

5. What was the main reason you purchased one of the Montana State Lands Recreation Licenses?
1. hunting 2. fishing 3. other __________
COMMENT: (AFTER recording comment please skip to # 11)

6. Do you plan to purchase one of these licenses next year?
__ YES (IF YES GO TO #7) __ NO (IF NO, GO TO #8)

7. What is the main reason you will be purchasing one of the Montana State Lands Recreation Licenses next year?
1. hunting 2. fishing 3. other___________

8. Would you have purchased one of these licenses this year if, in addition to hunting and fishing, it also gave you the right to access state school trust lands for hiking, wildlife observation or berry picking?
___ YES ___ NO

9. What is the main reason you did not purchase one of the Montana State Lands Recreation Licenses this year?
1. does not hunt
2. will not use state lands
3. fee is a "rip-off"
4. did not know about the issue
5. other___________

10. The Montana State Lands Recreation Use License costs $5. Would you have purchased one this year if it cost only $3? ___ YES ___ NO COMMENT:

11. Now I'd like to ask you just a couple of questions about yourself:
PLACE OF RESIDENCE: ______________ CITY/TOWN __________ STATE

12. What is your AGE ____ 13. Are you: ___ MALE __ FEMALE

14. Are you a member of any hunting, fishing or conservation organzations? __ YES __ NO

15. How would you rate HUNTING compared to your other outdoor recreation activities? I will read the categories to you: (CIRCLE ONE NUMBER)

1. It's my favorite outdoor recreation activity
2. It's one of my favorite outdoor recreation activities
3. It's just one of several outdoor recreation activities that I do.
4. I prefer other outdoor recreation activities.

16. Could you please also now rate FISHING on the same scale compared to your other outdoor recreation activities. I will read the categories again: (CIRCLE ONE NUMBER)

1. It's my favorite....
2. It's one of my favorites...
3. It's just one of several that I do
4. I prefer other outdoor activities.

17. Highest year of formal EDUCATION completed? : 1. some high school 2. completed high school 3. some college 4. completed college 5. postgraduate study or degree

18. I am going to read a list of income categories. Please tell me the category that best describes the total amount of income received by all of the members of your household in 1991. You can just tell me which letter applies. The categories are......(CIRCLE NUMBER)

1.....A. Under $5000. 2.....B. $5000 to $10,000 3.....C. $10,000 to $15,000
4.....D. $15,000 to $20,000 5.....E. $20,000 to $25,000 6.....F. $25,000 to $30,000
7.....G. $30,000 to $35,000 8.....H. $35,000 to $40,000 9.....I. $40,000 to $50,000
10....J. $50,000 to $75,000 11....K. $75,000 to $100,000 12....L. over $100,000

That's my last question. Thanks for your help!

APPENDIX B: Frequencies and Means for Conservation License and Recreational Use License Samples.

Frequencies and Means for DFWP Conservation License Sample.

```
----------------------------------- RES=0 -----------------------------------

Obs  Variable     N        Minimum        Maximum           Mean        Std Dev
--------------------------------------------------------------------------------
261  ID         261      1.0000000    606.0000000    239.0842912    127.5426647
     COOP       243      1.0000000      2.0000000      1.0534979      0.2254887
     REFUSE      35      1.0000000      1.0000000      1.0000000              0
     AWARE      225      1.0000000      2.0000000      1.5777778      0.4950148
     PURCHASE   224      1.0000000      2.0000000      1.6071429      0.4894793
     REASON      87      1.0000000      3.0000000      1.3218391      0.4940166
     NEXTYR     122      1.0000000      2.0000000      1.5163934      0.5017919
     REASON2     72      1.0000000      3.0000000      1.1666667      0.4111132
     ADDITION   130      1.0000000      2.0000000      1.7769231      0.4179200
     REASNOT    137      1.0000000      5.0000000      3.5985401      1.2033034
     THREE      123      1.0000000      2.0000000      1.5934959      0.4931897
     AGE        222     12.0000000     88.0000000     44.8288288     14.1080984
     SEX        221      1.0000000      2.0000000      1.0633484      0.2441416
     CLUB       221      1.0000000      2.0000000      1.4796380      0.5007194
     HUNT       222      1.0000000      4.0000000      1.8243243      1.0337049
     FISH       221      1.0000000      5.0000000      2.0723982      0.9743101
     EDUCATE    220      1.0000000      8.0000000      3.0500000      1.1867803
     INC        187        5000.00      100000.00       49438.50       22891.29
--------------------------------------------------------------------------------

----------------------------------- RES=1 -----------------------------------

Obs  Variable     N        Minimum        Maximum           Mean        Std Dev
--------------------------------------------------------------------------------
349  ID         349      9.0000000    887.0000000    355.9111748    192.4563859
     COOP       330      1.0000000      1.0000000      1.0000000              0
     REFUSE       4      1.0000000      2.0000000      1.2500000      0.5000000
     AWARE      345      1.0000000      2.0000000      1.3536232      0.4787884
     PURCHASE   347      1.0000000      2.0000000      1.7608069      0.4272069
     REASON      85      1.0000000      3.0000000      1.3411765      0.5680573
     NEXTYR     270      1.0000000      2.0000000      1.4370370      0.4969409
     REASON2    156      1.0000000      3.0000000      1.3525641      0.5881023
     ADDITION   258      1.0000000      2.0000000      1.8023256      0.3990192
     REASNOT    260      1.0000000      5.0000000      2.9538462      1.1910966
     THREE      246      1.0000000      2.0000000      1.6951220      0.4612943
     AGE        345     12.0000000     82.0000000     40.7507246     16.4018010
     SEX        341      1.0000000      2.0000000      1.2316716      0.4225203
     CLUB       343      1.0000000      2.0000000      1.7055394      0.4564658
     HUNT       348      1.0000000      4.0000000      2.3333333      1.1328642
     FISH       347      1.0000000      4.0000000      2.1268012      0.8938142
     EDUCATE    338      1.0000000      5.0000000      2.6627219      1.0528332
     INC        269        5000.00      100000.00       31942.38       18658.74
--------------------------------------------------------------------------------
```

```
------------------------------------ RES=0 ------------------------------------
                                           Cumulative  Cumulative
              COOP   Frequency   Percent   Frequency    Percent
              -----------------------------------------------------
                 1        230      94.7         230       94.7
                 2         13       5.3         243      100.0

                            Frequency Missing = 18


                                           Cumulative  Cumulative
             AWARE   Frequency   Percent   Frequency    Percent
             ------------------------------------------------------
                 1         95      42.2          95       42.2
                 2        130      57.8         225      100.0

                            Frequency Missing = 36


                                             Cumulative  Cumulative
            PURCHASE   Frequency   Percent   Frequency    Percent
            -------------------------------------------------------
                   1          88      39.3          88       39.3
                   2         136      60.7         224      100.0

                            Frequency Missing = 37


                                            Cumulative  Cumulative
             REASON   Frequency   Percent   Frequency    Percent
             -------------------------------------------------------
                  1          60      69.0          60       69.0
                  2          26      29.9          86       98.9
                  3           1       1.1          87      100.0

                           Frequency Missing = 174


                                            Cumulative  Cumulative
             NEXTYR   Frequency   Percent   Frequency    Percent
             -------------------------------------------------------
                  1          59      48.4          59       48.4
                  2          63      51.6         122      100.0

                           Frequency Missing = 139
```

```
                                    Cumulative  Cumulative
REASON2    Frequency    Percent     Frequency     Percent
----------------------------------------------------------
      1          61       84.7            61        84.7
      2          10       13.9            71        98.6
      3           1        1.4            72       100.0

               Frequency Missing = 189



                                     Cumulative  Cumulative
ADDITION    Frequency    Percent     Frequency     Percent
-----------------------------------------------------------
       1          29       22.3            29        22.3
       2         101       77.7           130       100.0

                Frequency Missing = 131



                                    Cumulative  Cumulative
REASNOT    Frequency    Percent     Frequency     Percent
----------------------------------------------------------
      1           2        1.5             2         1.5
      2          41       29.9            43        31.4
      3           2        1.5            45        32.8
      4          57       41.6           102        74.5
      5          35       25.5           137       100.0

               Frequency Missing = 124



                                  Cumulative  Cumulative
THREE    Frequency    Percent     Frequency     Percent
--------------------------------------------------------
    1          50       40.7            50        40.7
    2          73       59.3           123       100.0

             Frequency Missing = 138



                                  Cumulative  Cumulative
STATE    Frequency    Percent     Frequency     Percent
--------------------------------------------------------
AB              1        0.4             1         0.4
AK              2        0.9             3         1.3
AL              3        1.3             6         2.7
AZ              6        2.7            12         5.4
CA             18        8.1            30        13.5
```

```
CO             4       1.8          34        15.2
CT             1       0.4          35        15.7
FL             4       1.8          39        17.5
HI             1       0.4          40        17.9
IA             1       0.4          41        18.4
ID            12       5.4          53        23.8
IL             5       2.2          58        26.0
IN             1       0.4          59        26.5
KY             2       0.9          61        27.4
LA             2       0.9          63        28.3
MA             2       0.9          65        29.1
MD             1       0.4          66        29.6
ME             2       0.9          68        30.5
MI            12       5.4          80        35.9
MN            16       7.2          96        43.0
MO             3       1.3          99        44.4
MS             1       0.4         100        44.8
NB             1       0.4         101        45.3
NC             2       0.9         103        46.2
ND            12       5.4         115        51.6
NH             1       0.4         116        52.0
NJ             5       2.2         121        54.3
NM             1       0.4         122        54.7
NV             2       0.9         124        55.6
NY             5       2.2         129        57.8
OH             2       0.9         131        58.7
OK             1       0.4         132        59.2
OR             1       0.4         133        59.6
PA            18       8.1         151        67.7
SD             4       1.8         155        69.5
TN             1       0.4         156        70.0
TX             6       2.7         162        72.6
UT             1       0.4         163        73.1
VA             4       1.8         167        74.9
WA            34      15.2         201        90.1
WI            20       9.0         221        99.1
WY             2       0.9         223       100.0

               Frequency Missing = 38


                            Cumulative   Cumulative
 SEX   Frequency   Percent   Frequency     Percent
 --------------------------------------------------
   1         207      93.7         207        93.7
   2          14       6.3         221       100.0

               Frequency Missing = 40



                             Cumulative   Cumulative
 CLUB   Frequency   Percent   Frequency     Percent
 ---------------------------------------------------
    1         115      52.0         115        52.0
    2         106      48.0         221       100.0

               Frequency Missing = 40
```

```
                              Cumulative  Cumulative
  HUNT   Frequency   Percent   Frequency    Percent
  --------------------------------------------------
     1         115     51.8         115       51.8
     2          57     25.7         172       77.5
     3          24     10.8         196       88.3
     4          26     11.7         222      100.0

                Frequency Missing = 39


                              Cumulative  Cumulative
  FISH   Frequency   Percent   Frequency    Percent
  --------------------------------------------------
     1          71     32.1          71       32.1
     2          88     39.8         159       71.9
     3          38     17.2         197       89.1
     4          23     10.4         220       99.5
     5           1      0.5         221      100.0

                Frequency Missing = 40


                               Cumulative  Cumulative
EDUCATE   Frequency   Percent   Frequency    Percent
-----------------------------------------------------
      1          15      6.8          15        6.8
      2          62     28.2          77       35.0
      3          76     34.5         153       69.5
      4          34     15.5         187       85.0
      5          32     14.5         219       99.5
      8           1      0.5         220      100.0

                Frequency Missing = 41
```

```
----------------------------------- RES=1 ---------------------------------------

              COOP   Frequency   Percent   Frequency    Percent
              ---------------------------------------------------
                 1        330     100.0         330      100.0

                            Frequency Missing = 19



                                             Cumulative  Cumulative
             AWARE   Frequency   Percent      Frequency    Percent
             ----------------------------------------------------
                 1        223      64.6           223       64.6
                 2        122      35.4           345      100.0

                            Frequency Missing = 4



                                               Cumulative  Cumulative
            PURCHASE   Frequency   Percent      Frequency    Percent
            ------------------------------------------------------
                   1          83      23.9             83       23.9
                   2         264      76.1            347      100.0

                            Frequency Missing = 2


                                              Cumulative  Cumulative
             REASON   Frequency   Percent      Frequency    Percent
             -----------------------------------------------------
                  1          60      70.6             60       70.6
                  2          21      24.7             81       95.3
                  3           4       4.7             85      100.0

                           Frequency Missing = 264


                                              Cumulative  Cumulative
             NEXTYR   Frequency   Percent      Frequency    Percent
             -----------------------------------------------------
                  1         152      56.3            152       56.3
                  2         118      43.7            270      100.0

                            Frequency Missing = 79



                                              Cumulative  Cumulative
            REASON2   Frequency   Percent      Frequency    Percent
```

```
-----------------------------------------------------
      1         110      70.5         110       70.5
      2          37      23.7         147       94.2
      3           9       5.8         156      100.0

               Frequency Missing = 193

                                Cumulative  Cumulative
ADDITION   Frequency   Percent   Frequency     Percent
------------------------------------------------------
       1         51       19.8          51       19.8
       2        207       80.2         258      100.0

                Frequency Missing = 91


                               Cumulative  Cumulative
REASNOT   Frequency   Percent   Frequency     Percent
-----------------------------------------------------
      1          15       5.8          15        5.8
      2         116      44.6         131       50.4
      3          24       9.2         155       59.6
      4          76      29.2         231       88.8
      5          29      11.2         260      100.0

                Frequency Missing = 89


                              Cumulative  Cumulative
 THREE   Frequency   Percent   Frequency     Percent
 --------------------------------------------------
     1          75      30.5          75       30.5
     2         171      69.5         246      100.0

               Frequency Missing = 103


                             Cumulative  Cumulative
  SEX   Frequency   Percent   Frequency     Percent
  -------------------------------------------------
    1         262      76.8         262       76.8
    2          79      23.2         341      100.0

                Frequency Missing = 8


                              Cumulative  Cumulative
  CLUB   Frequency   Percent   Frequency     Percent
  --------------------------------------------------
     1         101      29.4         101       29.4
     2         242      70.6         343      100.0

                Frequency Missing = 6
```

```
                                    Cumulative  Cumulative
HUNT   Frequency   Percent   Frequency    Percent
--------------------------------------------------
   1        102     29.3          102       29.3
   2        110     31.6          212       60.9
   3         54     15.5          266       76.4
   4         82     23.6          348      100.0

               Frequency Missing = 1


                                    Cumulative  Cumulative
FISH   Frequency   Percent   Frequency    Percent
--------------------------------------------------
   1         89     25.6           89       25.6
   2        155     44.7          244       70.3
   3         73     21.0          317       91.4
   4         30      8.6          347      100.0

               Frequency Missing = 2


                                       Cumulative  Cumulative
EDUCATE   Frequency   Percent   Frequency    Percent
-----------------------------------------------------
      1          40     11.8           40       11.8
      2         120     35.5          160       47.3
      3         115     34.0          275       81.4
      4          40     11.8          315       93.2
      5          23      6.8          338      100.0

               Frequency Missing = 11
```

Frequencies and Means for DSL State Lands Recreational Use License Sample. RES=1 are Residents. RES=0 are Nonresidents.

```
----------------------------------- RES=0 -----------------------------------

N Obs  Variable      N       Minimum       Maximum          Mean       Std Dev
------------------------------------------------------------------------------
  337  COOPERAT    337     1.0000000     1.0000000     1.0000000             0
       USE         333     1.0000000     3.0000000     1.6456456     0.6635660
       PLANS       138     1.0000000     2.0000000     1.9275362     0.2601987
       SUB0         93     1.0000000     3.0000000     1.4516129     0.7149966
       TOTTRIPS    154     1.0000000    51.0000000     2.1428571     4.6854364
       PURPOSE1    155     1.0000000     7.0000000     3.4129032     2.0251250
       SUB1        120     1.0000000     3.0000000     1.5916667     0.7938401
       BAG         144     1.0000000     3.0000000     1.2291667     0.4380304
       SHOOT       115     1.0000000     5.0000000     2.0608696     0.9392696
       PASS        116     1.0000000     3.0000000     1.3275862     0.4894693
       NUMPASS     337             0    99.0000000     4.0118694    13.6224553
       SIZE1        86     1.0000000     2.0000000     1.7906977     0.4091966
       SECTIONS     18     2.0000000    96.0000000    14.2222222    23.6134447
       DAYS1       153     1.0000000   565.0000000    12.7124183    45.2606011
       MILES1      148     7.0000000       5000.00       1224.34   808.7551075
       HOURS       138             0        999.00    25.4347826    84.7045493
       MINUTES     138             0    30.0000000     3.0579710     9.0873845
       GT_ONCE     150     1.0000000     2.0000000     1.7600000     0.4285139
       TVISITS1    144     1.0000000    51.0000000     2.0416667     4.8007502
       SAME         34     1.0000000     2.0000000     1.2058824     0.4104256
       BIRDS       337             0    10.0000000     0.1216617     0.8486892
       ANTELOPE    337             0    10.0000000     0.0474777     0.5596565
       DEER        337             0    11.0000000     0.1721068     0.9605582
       ELK         337             0    24.0000000     0.1632047     1.4740046
       OTH_HUNT    337             0     1.0000000     0.0029674     0.0544735
       FISHING     337             0    20.0000000     0.0623145     1.0906685
       OTH         337             0     1.0000000     0.0059347     0.0769224
       SPEND       151    10.0000000       8000.00       1438.81       1305.19
       PRIME       152     1.0000000     5.0000000     1.8947368     1.3721829
       AQUAINT     128     1.0000000     2.0000000     1.5546875     0.4989531
       MORE        121     1.0000000     2.0000000     1.8512397     0.3573317
       PURPOSE2     13     1.0000000     7.0000000     4.6923077     2.2503561
       SIZE2         4     1.0000000    14.0000000     6.2500000     5.7373048
       DAYS2        16     1.0000000    14.0000000     4.5000000     3.8987177
       MILES2       14    65.0000000       2260.00   847.5000000   586.8289949
       VISITS2      14     1.0000000     6.0000000     1.5714286     1.3985864
       PURPOSE3      4     1.0000000     5.0000000     3.0000000     2.3094011
       SIZE3         0             .             .             .             .
       DAYS3         4     1.0000000     3.0000000     2.0000000     0.8164966
       MILES3        4    60.0000000       1300.00   417.5000000   590.0494330
       TVISITS3      4     2.0000000    20.0000000     8.2500000     8.0156098
       PUTPOSE4    337             0     1.0000000     0.0029674     0.0544735
       SIZE4         0             .             .             .             .
       DAYS4         1     1.0000000     1.0000000     1.0000000             .
       MILES4        1       1300.00       1300.00       1300.00             .
       TVISITS4      1     1.0000000     1.0000000     1.0000000             .
       PURPOSE5      0             .             .             .             .
       SIZE5         0             .             .             .             .
       DAYS5         0             .             .             .             .
       MILES5        0             .             .             .             .
       TVISITS5      0             .             .             .             .
       OUTFIT      152     1.0000000     2.0000000     1.6776316     0.4689282
       OTH_LNDS    323     1.0000000     8.0000000     1.2538700     0.5660769
```

```
     O_BIRDS      337              0     20.0000000      0.6854599      2.3111136
     O_ANTELP     337              0     14.0000000      0.5103858      1.3630036
     O_DEER       337              0     15.0000000      1.2195846      2.3690406
     O_ELK        337              0     26.0000000      0.8694362      2.5752110
     O_OTHHNT     337              0      6.0000000      0.0771513      0.5175321
     BID          337     10.0000000    200.0000000     38.3086053     43.7537721
     RESP         337              0      1.0000000      0.5608309      0.4970238
     REAS_NO      123      1.0000000      5.0000000      2.9837398      1.3907407
     AGE          331     12.0000000     74.0000000     43.0815710     12.5189308
     SEX          333      1.0000000      2.0000000      1.0330330      0.1789918
     CONSERV      329      1.0000000      2.0000000      1.3191489      0.4668569
     EDUCATE      330      1.0000000      5.0000000      3.1454545      1.1708441
     INCOME       337              0     12.0000000      8.3234421      3.1958608
------------------------------------------------------------------------------------

-------------------------------------- RES=1 ---------------------------------------

Obs  Variable       N        Minimum        Maximum           Mean        Std Dev
------------------------------------------------------------------------------------
2037 COOPERAT    2026      1.0000000      2.0000000      1.0039487      0.0627297
     USE         2016      1.0000000      3.0000000      1.6810516      0.5927252
     PLANS       1099      1.0000000      3.0000000      1.8143767      0.3936343
     SUB0         717      1.0000000      4.0000000      2.1813110      0.7644598
     TOTTRIPS     780      1.0000000    500.0000000      6.3320513     19.3496640
     PURPOSE1     784      1.0000000      7.0000000      4.0714286      1.9749388
     SUB1         630      1.0000000      3.0000000      2.0111111      0.8296208
     BAG          681      1.0000000      3.0000000      1.5154185      0.5030614
     SHOOT        335      1.0000000      5.0000000      2.2208955      0.8714599
     PASS         550      1.0000000      3.0000000      1.5400000      0.5132489
     NUMPASS     2037              0     99.0000000      0.8306333      5.0382900
     SIZE1        372      1.0000000      2.0000000      1.4623656      0.4992531
     SECTIONS     107      1.0000000     80.0000000      8.8411215     13.8408403
     DAYS1        777      1.0000000    210.0000000      3.3616474     12.3715762
     MILES1       767      1.0000000        1000.00     87.6010430    113.0865442
     HOURS        774              0    302.0000000      2.1369509     11.2343888
     MINUTES      774              0     55.0000000     16.7105943     16.0107973
     GT_ONCE      773      1.0000000      5.0000000      1.3285899      0.4862596
     TVISITS1     730      1.0000000     99.0000000      4.6123288      7.2254778
     SAME         489      1.0000000      4.0000000      1.1206544      0.3443972
     BIRDS       2037              0     44.0000000      0.0839470      1.2901023
     ANTELOPE    2037              0      5.0000000      0.0132548      0.1725831
     DEER        2037              0     50.0000000      0.2268041      1.7491531
     ELK         2037              0     99.0000000      0.2680412      2.9619102
     OTH_HUNT    2037              0     10.0000000      0.0117820      0.2504585
     FISHING     2037              0     30.0000000      0.0908198      1.2086375
     OTH         2037              0     39.0000000      0.0466372      1.0592862
     SPEND        732      1.0000000        2500.00     88.0368852    183.2852501
     PRIME        775      1.0000000      5.0000000      2.0490323      1.3256254
     AQUAINT      559      1.0000000      3.0000000      1.5688730      0.4992798
     MORE         626      1.0000000      2.0000000      1.6629393      0.4730838
     PURPOSE2     205      1.0000000      7.0000000      3.7707317      1.9430928
     SIZE2         87      1.0000000     40.0000000      3.1609195      5.1869101
     DAYS2        213      1.0000000     18.0000000      1.8403756      1.7436851
     MILES2       210      1.0000000    650.0000000     90.5523810    110.0677026
     VISITS2      213      1.0000000     52.0000000      3.9154930      5.7274903
     PURPOSE3      47      1.0000000      7.0000000      4.0000000      1.7937088
     SIZE3         20      1.0000000     30.0000000      3.1000000      6.4473577
     DAYS3         49      1.0000000     10.0000000      1.4897959      1.4012264
     MILES3        48      1.0000000    250.0000000     55.3958333     57.5739079
```

```
TVISITS3    50      1.0000000     30.0000000      5.0200000      5.5087685
PUTPOSE4  2037              0      7.0000000      0.0289642      0.4094243
SIZE4        4      1.0000000      3.0000000      2.0000000      0.8164966
DAYS4       11      1.0000000      5.0000000      1.6363636      1.2862914
MILES4      11      8.0000000    150.0000000     51.0000000     40.8998778
TVISITS4    11      1.0000000     15.0000000      3.8181818      3.9703446
PURPOSE5     6      2.0000000      7.0000000      4.5000000      1.7606817
SIZE5        2      1.0000000      2.0000000      1.5000000      0.7071068
DAYS5        6      1.0000000      3.0000000      1.3333333      0.8164966
MILES5       6     30.0000000    200.0000000     73.3333333     65.2431350
TVISITS5     6      1.0000000      4.0000000      2.0000000      1.0954451
OUTFIT     749      1.0000000      2.0000000      1.9799733      0.1401851
OTH_LNDS  1990      1.0000000      3.0000000      1.1452261      0.3552590
O_BIRDS   2037              0     65.0000000      2.0976927      5.6266259
O_ANTELP  2037              0     35.0000000      0.8257241      2.1348373
O_DEER    2037              0     60.0000000      5.3760432      7.3922499
O_ELK     2037              0     60.0000000      4.1728031      6.8683656
O_OTHHNT  2037              0     60.0000000      0.6504664      3.1928158
BID       2037     10.0000000    100.0000000     34.9779087     28.6566800
RESP      2037              0      1.0000000      0.2415317      0.4281169
REAS_NO   1406      1.0000000      5.0000000      2.5910384      1.5440961
AGE       2026     12.0000000     85.0000000     40.8598223     14.6719551
SEX       2033      1.0000000      4.0000000      1.1210034      0.3307064
CONSERV   2020      1.0000000      4.0000000      1.6242574      0.4874916
EDUCATE   1965      1.0000000      8.0000000      2.7002545      1.1400079
INCOME    2037              0     26.0000000      5.7172312      3.3870438
---------------------------------------------------------------------------
```

```
---------------------------------- RES=0 -----------------------------------


                                           Cumulative  Cumulative
           COOPERAT   Frequency   Percent   Frequency    Percent
           -------------------------------------------------------
                  1        337     100.0          337     100.0


                                        Cumulative  Cumulative
             USE   Frequency   Percent   Frequency    Percent
             --------------------------------------------------
               1        153      45.9         153      45.9
               2        145      43.5         298      89.5
               3         35      10.5         333     100.0

                           Frequency Missing = 4


                                         Cumulative  Cumulative
            PLANS   Frequency   Percent   Frequency    Percent
            ----------------------------------------------------
                1         10       7.2          10       7.2
                2        128      92.8         138     100.0

                          Frequency Missing = 199


                                         Cumulative  Cumulative
             SUBO   Frequency   Percent   Frequency    Percent
             ---------------------------------------------------
                1         63      67.7          63      67.7
                2         18      19.4          81      87.1
                3         12      12.9          93     100.0

                          Frequency Missing = 244


                                           Cumulative  Cumulative
           PURPOSE1   Frequency   Percent   Frequency    Percent
           -------------------------------------------------------
                  1         22      14.2           22      14.2
                  2         33      21.3           55      35.5
                  3         61      39.4          116      74.8
                  4          1       0.6          117      75.5
                  5          6       3.9          123      79.4
                  7         32      20.6          155     100.0

                          Frequency Missing = 182
```

```
                            Cumulative  Cumulative
SUB1   Frequency   Percent   Frequency    Percent
--------------------------------------------------
   1         72      60.0          72       60.0
   2         25      20.8          97       80.8
   3         23      19.2         120      100.0

             Frequency Missing = 217
```

```
                           Cumulative  Cumulative
BAG   Frequency   Percent   Frequency    Percent
-------------------------------------------------
  1        112      77.8         112       77.8
  2         31      21.5         143       99.3
  3          1       0.7         144      100.0

             Frequency Missing = 193
```

```
                             Cumulative  Cumulative
SHOOT   Frequency   Percent   Frequency    Percent
---------------------------------------------------
    1         33      28.7          33       28.7
    2         55      47.8          88       76.5
    3         15      13.0         103       89.6
    4         11       9.6         114       99.1
    5          1       0.9         115      100.0

              Frequency Missing = 222
```

```
                            Cumulative  Cumulative
PASS   Frequency   Percent   Frequency    Percent
--------------------------------------------------
   1         79      68.1          79       68.1
   2         36      31.0         115       99.1
   3          1       0.9         116      100.0

             Frequency Missing = 221
```

```
                                        Cumulative  Cumulative
COUNTY1            Frequency   Percent   Frequency    Percent
--------------------------------------------------------------
BEAVERHEAD                8       10.3           8       10.3
BLAINE OR HARVE           1        1.3           9       11.5
Beaverhead                3        3.8          12       15.4
Breaks                    1        1.3          13       16.7
CARBON                    1        1.3          14       17.9
```

```
CASCADE                1        1.3          15        19.2
CUSTER                 2        2.6          17        21.8
Carter                 1        1.3          18        23.1
Custer                 1        1.3          19        24.4
DANIELS                1        1.3          20        25.6
DAWSON                 3        3.8          23        29.5
FALLON                 1        1.3          24        30.8
FERGUS                 3        3.8          27        34.6
FLATHEAD               1        1.3          28        35.9
GARFIELD               1        1.3          29        37.2
Garfield               2        2.6          31        39.7
Hill                   1        1.3          32        41.0
L AND C                1        1.3          33        42.3
LEWIS AND CLARK        1        1.3          34        43.6
Lake                   1        1.3          35        44.9
Lewis and Clark        1        1.3          36        46.2
MADISON                2        2.6          38        48.7
MEAGHAR                3        3.8          41        52.6
MEAGHER                1        1.3          42        53.8
MUSSEL SHELL           1        1.3          43        55.1
Missoula               1        1.3          44        56.4
PARK                   4        5.1          48        61.5
PETROLEUM              3        3.8          51        65.4
PHILLIPS               1        1.3          52        66.7
POWDER                 1        1.3          53        67.9
POWDER RIVER           4        5.1          57        73.1
POWELL                 3        3.8          60        76.9
Paririe                1        1.3          61        78.2
Park                   1        1.3          62        79.5
RAVALLI                1        1.3          63        80.8
RICHLAND               1        1.3          64        82.1
ROSEBUD                1        1.3          65        83.3
SHERIDAN               2        2.6          67        85.9
SWEETGRASS             1        1.3          68        87.2
Sanders                1        1.3          69        88.5
Sheridan               2        2.6          71        91.0
Sweetgrass             1        1.3          72        92.3
VALLEY                 2        2.6          74        94.9
Valley                 1        1.3          75        96.2
YELLOWSTONE            2        2.6          77        98.7
Yellowstone            1        1.3          78       100.0

                 Frequency Missing = 259


                                   Cumulative  Cumulative
     SIZE1   Frequency   Percent   Frequency    Percent
     --------------------------------------------------
         1         18      20.9          18       20.9
         2         68      79.1          86      100.0

                 Frequency Missing = 251


                                    Cumulative  Cumulative
    GT_ONCE   Frequency   Percent   Frequency    Percent
    ---------------------------------------------------
```

```
      1         36       24.0          36        24.0
      2        114       76.0         150       100.0

                 Frequency Missing = 187



                                   Cumulative  Cumulative
  SAME    Frequency    Percent     Frequency    Percent
  -----------------------------------------------------
     1          27       79.4            27        79.4
     2           7       20.6            34       100.0

                 Frequency Missing = 303



                                   Cumulative  Cumulative
 PRIME    Frequency    Percent     Frequency    Percent
 ------------------------------------------------------
     1          97       63.8            97        63.8
     2          11        7.2           108        71.1
     3          24       15.8           132        86.8
     4           3        2.0           135        88.8
     5          17       11.2           152       100.0

                 Frequency Missing = 185



                                    Cumulative  Cumulative
AQUAINT    Frequency    Percent     Frequency    Percent
--------------------------------------------------------
      1          57       44.5            57        44.5
      2          71       55.5           128       100.0

                 Frequency Missing = 209



                                   Cumulative  Cumulative
  MORE    Frequency    Percent     Frequency    Percent
  -----------------------------------------------------
     1          18       14.9            18        14.9
     2         103       85.1           121       100.0

                 Frequency Missing = 216



                                      Cumulative  Cumulative
PURPOSE2    Frequency    Percent     Frequency    Percent
----------------------------------------------------------
       1           1        7.7             1         7.7
       2           2       15.4             3        23.1
```

```
           3          2      15.4           5       38.5
           5          3      23.1           8       61.5
           7          5      38.5          13      100.0

                   Frequency Missing = 324


                                        Cumulative  Cumulative
COUNTY2            Frequency   Percent   Frequency    Percent
---------------------------------------------------------------
BEAVERHEAD                2      25.0           2       25.0
CHOTEAU                   1      12.5           3       37.5
Carter                    1      12.5           4       50.0
FERGUS                    1      12.5           5       62.5
FLATHEAD                  1      12.5           6       75.0
GALLATIN                  1      12.5           7       87.5
Park                      1      12.5           8      100.0

                   Frequency Missing = 329


                                  Cumulative  Cumulative
     SIZE2   Frequency   Percent   Frequency    Percent
     ----------------------------------------------------
         1          1      25.0           1       25.0
         3          1      25.0           2       50.0
         7          1      25.0           3       75.0
        14          1      25.0           4      100.0

                   Frequency Missing = 333


                                    Cumulative  Cumulative
    PURPOSE3   Frequency   Percent   Frequency    Percent
    -------------------------------------------------------
           1          2      50.0           2       50.0
           5          2      50.0           4      100.0

                   Frequency Missing = 333


                                        Cumulative  Cumulative
COUNTY3            Frequency   Percent   Frequency    Percent
---------------------------------------------------------------
CASCADE                   1      33.3           1       33.3
SHERIDAN                  1      33.3           2       66.7
VALLEY                    1      33.3           3      100.0

                   Frequency Missing = 334


                                    Cumulative  Cumulative
         PUTPOSE4    Frequency    Percent    Frequency     Percent
         ------------------------------------------------------------
                0          336       99.7          336        99.7
                1            1        0.3          337       100.0


                                                  Cumulative  Cumulative
    COUNTY4                 Frequency    Percent   Frequency     Percent
    -----------------------------------------------------------------------
    FERGUS                          1      100.0           1       100.0

                            Frequency Missing = 336


                                         Cumulative  Cumulative
         OUTFIT    Frequency    Percent   Frequency     Percent
         -----------------------------------------------------------
              1           49       32.2          49        32.2
              2          103       67.8         152       100.0

                            Frequency Missing = 185


                                           Cumulative  Cumulative
         OTH_LNDS    Frequency    Percent   Frequency     Percent
         -------------------------------------------------------------
                1          247       76.5         247        76.5
                2           75       23.2         322        99.7

                            Frequency Missing = 14


                                      Cumulative  Cumulative
         BID    Frequency    Percent   Frequency     Percent
         ------------------------------------------------------
          10           57       16.9          57        16.9
          15           50       14.8         107        31.8
          20           53       15.7         160        47.5
          25           42       12.5         202        59.9
          30           51       15.1         253        75.1
          50           43       12.8         296        87.8
          **           41       12.2         337       100.0


                                       Cumulative  Cumulative
         RESP    Frequency    Percent   Frequency     Percent
         -------------------------------------------------------
            0          148       43.9         148        43.9
            1          189       56.1         337       100.0
```

```
                                       Cumulative  Cumulative
REAS_NO   Frequency     Percent     Frequency     Percent
---------------------------------------------------------
      1         27        22.0            27        22.0
      2         15        12.2            42        34.1
      3         37        30.1            79        64.2
      4         21        17.1           100        81.3
      5         23        18.7           123       100.0

               Frequency Missing = 214

                                     Cumulative  Cumulative
SEX   Frequency     Percent     Frequency     Percent
-----------------------------------------------------
  1        322        96.7           322        96.7
  2         11         3.3           333       100.0

               Frequency Missing = 4


                                       Cumulative  Cumulative
CONSERV   Frequency     Percent     Frequency     Percent
---------------------------------------------------------
      1        224        68.1           224        68.1
      2        105        31.9           329       100.0

               Frequency Missing = 8


                                       Cumulative  Cumulative
EDUCATE   Frequency     Percent     Frequency     Percent
---------------------------------------------------------
      1         21         6.4            21         6.4
      2         90        27.3           111        33.6
      3         91        27.6           202        61.2
      4         76        23.0           278        84.2
      5         52        15.8           330       100.0

               Frequency Missing = 7
```

```
----------------------------------- RES=1 -----------------------------------

                                          Cumulative  Cumulative
           COOPERAT   Frequency   Percent  Frequency    Percent
           -----------------------------------------------------
                  1       2018      99.6       2018       99.6
                  2          8       0.4       2026      100.0

                           Frequency Missing = 11



                                       Cumulative  Cumulative
             USE   Frequency   Percent  Frequency    Percent
             --------------------------------------------------
               1        778      38.6        778       38.6
               2       1103      54.7       1881       93.3
               3        135       6.7       2016      100.0

                           Frequency Missing = 21



                                         Cumulative  Cumulative
            PLANS   Frequency   Percent   Frequency    Percent
            ---------------------------------------------------
                1        206      18.7         206       18.7
                2        891      81.1        1097       99.8
                3          2       0.2        1099      100.0

                          Frequency Missing = 938



                                         Cumulative  Cumulative
             SUBO   Frequency   Percent   Frequency    Percent
             --------------------------------------------------
                1        155      21.6         155       21.6
                2        278      38.8         433       60.4
                3        283      39.5         716       99.9

                          Frequency Missing = 1320

                                           Cumulative  Cumulative
           PURPOSE1   Frequency   Percent   Frequency    Percent
           -----------------------------------------------------
                  1         54       6.9          54        6.9
                  2         80      10.2         134       17.1
                  3        333      42.5         467       59.6
                  4         13       1.7         480       61.2
                  5         94      12.0         574       73.2
                  6         13       1.7         587       74.9
                  7        197      25.1         784      100.0

                          Frequency Missing = 1253
```

```
                                   Cumulative  Cumulative
SUB1   Frequency     Percent     Frequency      Percent
---------------------------------------------------------
   1         213        33.8           213        33.8
   2         197        31.3           410        65.1
   3         220        34.9           630       100.0

              Frequency Missing = 1407
```

```
                                   Cumulative  Cumulative
BAG    Frequency     Percent     Frequency      Percent
---------------------------------------------------------
   1         331        48.6           331        48.6
   2         349        51.2           680        99.9

              Frequency Missing = 1356
```

```
                                   Cumulative  Cumulative
SHOOT  Frequency     Percent     Frequency      Percent
---------------------------------------------------------
   1          53        15.8            53        15.8
   2         193        57.6           246        73.4
   3          58        17.3           304        90.7
   4          24         7.2           328        97.9
   5           7         2.1           335       100.0

              Frequency Missing = 1702
```

```
                                   Cumulative  Cumulative
PASS   Frequency     Percent     Frequency      Percent
---------------------------------------------------------
   1         257        46.7           257        46.7
   2         289        52.5           546        99.3

              Frequency Missing = 1487
```

```
                                   Cumulative  Cumulative
SIZE1  Frequency     Percent     Frequency      Percent
---------------------------------------------------------
   1         200        53.8           200        53.8
   2         172        46.2           372       100.0

              Frequency Missing = 1665
```

```
                                      Cumulative  Cumulative
GT_ONCE   Frequency     Percent     Frequency      Percent
-----------------------------------------------------------
      1        522        67.5            522         67.5
      2        250        32.3            772         99.9
      5          1         0.1            773        100.0

                  Frequency Missing = 1264



                                      Cumulative  Cumulative
SAME      Frequency     Percent     Frequency      Percent
-----------------------------------------------------------
   1           432        88.3            432         88.3
   2            56        11.5            488         99.8

                  Frequency Missing = 1548


                                      Cumulative  Cumulative
PRIME     Frequency     Percent     Frequency      Percent
-----------------------------------------------------------
    1          434        56.0            434         56.0
    2           32         4.1            466         60.1
    3          211        27.2            677         87.4
    4           33         4.3            710         91.6
    5           65         8.4            775        100.0

                  Frequency Missing = 1262

                                      Cumulative  Cumulative
AQUAINT   Frequency     Percent     Frequency      Percent
-----------------------------------------------------------
      1        242        43.3            242         43.3
      2        316        56.5            558         99.8

                  Frequency Missing = 1478



                                      Cumulative  Cumulative
MORE      Frequency     Percent     Frequency      Percent
-----------------------------------------------------------
   1           211        33.7            211         33.7
   2           415        66.3            626        100.0

                  Frequency Missing = 1411



                                       Cumulative  Cumulative
PURPOSE2   Frequency     Percent     Frequency      Percent
------------------------------------------------------------
```

```
              1          20         9.8          20          9.8
              2          36        17.6          56         27.3
              3          69        33.7         125         61.0
              4           5         2.4         130         63.4
              5          34        16.6         164         80.0
              6           3         1.5         167         81.5
              7          38        18.5         205        100.0

                      Frequency Missing = 1832


                                                Cumulative  Cumulative
COUNTY2                Frequency   Percent   Frequency    Percent
-------------------------------------------------------------------
BEAVERHEAD                     7       4.3           7        4.3
BIGHORN                        1       0.6           8        4.9
BLAINE                         2       1.2          10        6.1
BROADWATER                     3       1.8          13        7.9
Beaverhead                     2       1.2          15        9.1
Bighorn                        1       0.6          16        9.8
Broadwater                     1       0.6          17       10.4
CARBON                         1       0.6          18       11.0
CARTER                         1       0.6          19       11.6
CASCADE                        2       1.2          21       12.8
CHOTEAU                        8       4.9          29       17.7
Choteau                        2       1.2          31       18.9
DANIELS                        1       0.6          32       19.5
DEERLODGE                      1       0.6          33       20.1
FALLER                         1       0.6          34       20.7
FALLS                          1       0.6          35       21.3
FERGUS                         5       3.0          40       24.4
FLATHEAD                      21      12.8          61       37.2
Fergus                         3       1.8          64       39.0
Flahead                        1       0.6          65       39.6
Flathead                       4       2.4          69       42.1
GALLATIN                       2       1.2          71       43.3
GARFIELD                       2       1.2          73       44.5
GOAT CREEK                     1       0.6          74       45.1
Gallatin                       1       0.6          75       45.7
Gallitan                       1       0.6          76       46.3
Golden Valley                  1       0.6          77       47.0
HILL                           3       1.8          80       48.8
JEFFERSON                      3       1.8          83       50.6
Jefferson                      3       1.8          86       52.4
Judith Basin                   1       0.6          87       53.0
L & C                          1       0.6          88       53.7
L AND C                        5       3.0          93       56.7
LAKE                           5       3.0          98       59.8
LEWIS AND CLARK                1       0.6          99       60.4
LINCOLN                        9       5.5         108       65.9
Lewis and Clark                1       0.6         109       66.5
Lincoln                        1       0.6         110       67.1
MADISON                        3       1.8         113       68.9
MEAGHAR                        2       1.2         115       70.1
MEAGHER                        1       0.6         116       70.7
MINERAL                        1       0.6         117       71.3
MISSOULA                       4       2.4         121       73.8
MUSCLE SHELL                   1       0.6         122       74.4
```

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Madison                      1        0.6          123         75.0
Missoula                     1        0.6          124         75.6
PARK                         1        0.6          125         76.2
PETROLEUM                    1        0.6          126         76.8
PHILLIPS                     1        0.6          127         77.4
POWDER RIVER                 2        1.2          129         78.7
POWELL                       3        1.8          132         80.5
Philips                      1        0.6          133         81.1
RAVALLI                      4        2.4          137         83.5
ROOSEVELT                    1        0.6          138         84.1
ROSEBUD                      5        3.0          143         87.2
Ravalli                      1        0.6          144         87.8
SANDERS                      1        0.6          145         88.4
SWEET GRASS                  1        0.6          146         89.0
SWEETWATER                   1        0.6          147         89.6
Sanders                      2        1.2          149         90.9
TETON                        4        2.4          153         93.3
TOOLE                        2        1.2          155         94.5
TOOLE/LIBERTY                1        0.6          156         95.1
TREASURE                     2        1.2          158         96.3
Teton                        1        0.6          159         97.0
Valley                       1        0.6          160         97.6
WHEATLAND                    1        0.6          161         98.2
Wheatland                    1        0.6          162         98.8
YELLOWSTONE                  2        1.2          164        100.0

                   Frequency Missing = 1873


                                         Cumulative  Cumulative
    PURPOSE3   Frequency   Percent   Frequency    Percent
    ------------------------------------------------------
           1          5      10.6           5       10.6
           2          2       4.3           7       14.9
           3         17      36.2          24       51.1
           4          1       2.1          25       53.2
           5         15      31.9          40       85.1
           7          7      14.9          47      100.0

                   Frequency Missing = 1990


                                             Cumulative  Cumulative
COUNTY3                Frequency   Percent   Frequency    Percent
--------------------------------------------------------------
BEAVERHEAD                   1        2.9            1          2.9
BROADWATER                   1        2.9            2          5.9
CARBON                       1        2.9            3          8.8
CASCADE                      1        2.9            4         11.8
CHOTEAU                      2        5.9            6         17.6
DAWSON                       1        2.9            7         20.6
FLATHEAD                     6       17.6           13         38.2
Fergus                       1        2.9           14         41.2
Flathead                     3        8.8           17         50.0
Garfield                     1        2.9           18         52.9
L & C                        1        2.9           19         55.9
L AND C                      3        8.8           22         64.7
LAKE                         1        2.9           23         67.6
LIBBY                        1        2.9           24         70.6
MADISON                      2        5.9           26         76.5
```

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MISSOUSLA
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MISSOULA                       3        8.8           29          85.3
Missoula                       1        2.9           30          88.2
Teton                          1        2.9           31          91.2
Treasure                       1        2.9           32          94.1
VALLEY                         1        2.9           33          97.1
Yellowstone                    1        2.9           34         100.0

                  Frequency Missing = 2003


                                        Cumulative  Cumulative
    PUTPOSE4   Frequency     Percent     Frequency    Percent
    -----------------------------------------------------------
           0        2025        99.4          2025       99.4
           1           1         0.0          2026       99.5
           2           1         0.0          2027       99.5
           3           2         0.1          2029       99.6
           5           3         0.1          2032       99.8
           7           5         0.2          2037      100.0


                                            Cumulative  Cumulative
COUNTY4                Frequency     Percent     Frequency    Percent
-----------------------------------------------------------------------
FLATHEAD                       1        14.3             1       14.3
Garfield                       1        14.3             2       28.6
HILL                           1        14.3             3       42.9
Judith Basin                   1        14.3             4       57.1
Lincoln                        1        14.3             5       71.4
MMISSOULA                      1        14.3             6       85.7
VALLEY                         1        14.3             7      100.0

                  Frequency Missing = 2030

                                        Cumulative  Cumulative
    PURPOSE5   Frequency     Percent     Frequency    Percent
    -----------------------------------------------------------
           2           1        16.7             1       16.7
           3           1        16.7             2       33.3
           5           3        50.0             5       83.3
           7           1        16.7             6      100.0

                  Frequency Missing = 2031


                                            Cumulative  Cumulative
COUNTY5                Frequency     Percent     Frequency    Percent
-----------------------------------------------------------------------
FLATHEAD                       1        25.0             1       25.0
Judith Basin                   1        25.0             2       50.0
Lincoln                        1        25.0             3       75.0
Petroleum                      1        25.0             4      100.0

                  Frequency Missing = 2033
```

```
                                    Cumulative  Cumulative
OUTFIT    Frequency     Percent      Frequency     Percent
-----------------------------------------------------------
     1          15         2.0             15         2.0
     2         734        98.0            749       100.0

              Frequency Missing = 1288



                                     Cumulative  Cumulative
OTH_LNDS    Frequency     Percent     Frequency     Percent
-------------------------------------------------------------
       1        1703        85.6           1703        85.6
       2         285        14.3           1988        99.9
       3           2         0.1           1990       100.0

              Frequency Missing = 47
                                    Cumulative  Cumulative
BID    Frequency     Percent     Frequency     Percent
-------------------------------------------------------
 10         320        15.7            320        15.7
 15         290        14.2            610        29.9
 20         293        14.4            903        44.3
 25         292        14.3           1195        58.7
 30         283        13.9           1478        72.6
 50         277        13.6           1755        86.2
 **         282        13.8           2037       100.0



                                    Cumulative  Cumulative
RESP    Frequency     Percent     Frequency     Percent
--------------------------------------------------------
   0        1545        75.8           1545        75.8
   1         492        24.2           2037       100.0



                                    Cumulative  Cumulative
REAS_NO    Frequency     Percent     Frequency     Percent
-----------------------------------------------------------
      1         531        37.8            531        37.8
      2         228        16.2            759        54.0
      3         191        13.6            950        67.6
      4         197        14.0           1147        81.6
      5         259        18.4           1406       100.0

              Frequency Missing = 631



                                    Cumulative  Cumulative
SEX    Frequency     Percent     Frequency     Percent
```

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      ---------------------------------------------------------------
        1        1789        88.0           1789          88.0
        2         243        12.0           2032         100.0

                       Frequency Missing = 4



                                        Cumulative  Cumulative
CONSERV    Frequency     Percent     Frequency      Percent
-------------------------------------------------------------------
      1          761        37.7            761          37.7
      2         1258        62.3           2019         100.0

                       Frequency Missing = 17



                                        Cumulative  Cumulative
EDUCATE    Frequency     Percent     Frequency      Percent
-------------------------------------------------------------------
      1          245        12.5            245          12.5
      2          740        37.7            985          50.1
      3          517        26.3           1502          76.4
      4          288        14.7           1790          91.1
      5          174         8.9           1964          99.9
      8            1         0.1           1965         100.0

                       Frequency Missing = 72
```

APPENDIX C: Walsh, Johnson and McKean Summary of U.S. Fishing and Hunting Value Estimates.

Table 1. Net Economic Values Per Day Reported by TCM and CVM Demand Studies from 1968 to 1988 Applied to National Forest Recreation Use Categories, United States (Third Quarter, 1987 Dollars)

Activity	Visitor days 1,000[a]		Number of Estimates		Mean	Median	Standard Error of the Mean	95% Confidence Interval	Range
Total	226,533	(100.0%)	287	(100.0%)	$33.95	$27.02	1.67	30.68– 37.22	3.91–219.65
Camping, Picnicking, and Swimming	66,811	(29.5)	36	(12.5)	20.14	17.80	1.80	16.61– 23.67	7.05– 46.69
Camping	53,666	(23.7)	18	(6.3)	19.50	18.92	2.03	15.52– 23.48	8.26– 34.89
Picnicking	7,838	(3.5)	7	(2.4)	17.33	12.82	5.08	7.37– 27.29	7.05– 46.69
Swimming	5,405	(2.3)	11	(3.8)	22.97	18.60	3.79	15.54– 30.40	7.05– 42.94
Mechanical Travel and Viewing	68,423	(30.2)	11	(3.8)	25.42	21.44	5.14	15.35– 35.49	8.27– 68.65
Sightseeing and Off-road Driving	62,451	(27.6)	6	(2.1)	20.29	19.72	3.73	12.98– 27.60	10.33– 31.84
Boating, Motorized	4,301	(1.5)	5	(1.7)	31.56	25.67	10.36	11.25– 51.87	8.27– 68.65
Hiking, Horseback Riding, and Water Travel	19,900	(8.8)	17	(5.9)	41.74	24.72	10.53	21.10– 62.38	10.26–183.36
Hiking	12,740	(5.6)	6	(2.1)	29.08	23.62	5.82	17.67– 40.49	15.71– 55.81
Boating, Nonmotorized	3,419	(1.5)	11	(3.8)	48.68	25.36	15.85	17.61– 79.75	10.26–183.36
Winter Sports	14,730	(6.5)	12	(4.2)	28.50	24.39	4.48	19.72– 37.28	11.27– 66.69
Resorts, Cabins, and Organized Camps[b]	15,117	(6.7)	2	(0.7)	12.48	—	—	—	3.91– 19.93
Hunting	15,276	(6.7)	83	(28.9)	41.69	34.88	2.72	36.36– 47.02	16.58–142.40
Big Game Hunting	10,729	(4.7)	56	(19.5)	45.47	37.87	3.47	38.67– 52.27	19.81–142.40
Small Game Hunting	4,015	(1.8)	10	(3.5)	30.82	27.48	3.51	23.94– 37.70	18.72– 52.04
Migratory Waterfowl Hunting	532	(0.2)	17	(5.9)	35.64	25.27	5.87	24.13– 47.15	16.58–102.88
Fishing	15,208	(6.7)	88	(30.7)	39.25	29.59	3.80	31.80– 46.70	8.13–219.65
Cold Water Fishing	10,687	(4.7)	39	(13.6)	30.62	28.49	3.24	24.27– 36.97	10.07–118.12
Anadromous Fishing[c]	—	—	9	(3.1)	54.01	46.24	11.01	32.43– 75.59	16.85–127.26
Warm Water Fishing	4,072	(1.8)	23	(8.0)	23.55	22.50	2.46	18.73– 28.37	8.13– 59.42
Salt Water Fishing	226	(0.1)	17	(5.9)	72.49	53.35	14.05	44.95–100.03	18.69–219.65
Nonconsumptive Fish and Wildlife	1,532	(0.7)	14	(4.9)	22.20	20.49	2.30	17.69– 26.71	5.27– 38.06
Other Recreation Activities	9,537	(4.2)	9	(3.1)	18.82	16.06	3.65	11.67– 25.97	6.81– 43.39
Wilderness	12,014[d]	(4.5)	15	(5.2)	24.58	19.26	6.10	12.62– 36.54	8.72–106.26

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[a] Thousands of 12 hour recreation visitor days reported by the Forest Service, U.S. Department of Agriculture, for the year ending September 30, 1986. *Statistical Abstract of the United States, 1988*, p. 212.

[b] Resorts were 1.83% valued at $19.93 per day, seasonal and year around cabins were 3.06% valued at $3.91 per day, and organized camps were 1.79% valued the same as camping.

[c] Anadromous fishing estimates included in cold water fishing. Estimated as roughly 5%.

[d] Included above.

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